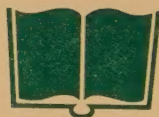


IN THE ZOO



W. REID BLAIR

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AFRICAN PYGMY OTA BENGHA, WITH CHIMPANZEE

[See page 76]

IN THE ZOO

REPRESENTING TWENTY-SEVEN YEARS OF OBSERVATION
AND STUDY OF THE ANIMALS IN THE
NEW YORK ZOOLOGICAL PARK

BY

W. REID BLAIR, D.V.Sc., LL.D.

DIRECTOR AND GENERAL CURATOR
NEW YORK ZOOLOGICAL PARK

FOREWORD BY

MADISON GRANT

PRESIDENT NEW YORK ZOOLOGICAL SOCIETY

PHOTOGRAPHICALLY ILLUSTRATED BY

ELWIN R. SANBORN

PHOTOGRAPHER EXTRAORDINARY TO THE NEW YORK ZOOLOGICAL PARK

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FOREWORD

DOCTOR W. REID BLAIR, Director of the New York Zoological Park, has embodied in the following pages the results of over twenty-five years of service as an officer of the Zoological Society. Such experience and his sympathetic understanding of the animals in his charge, together with a keen appreciation of the mentality and temperament of the higher mammals, give his observations a peculiar value.

Few living men have had his opportunities to observe for so many years so large and varied an assortment of animals. His surgical and medical knowledge has been of the greatest value to the Zoological Society, and we hope, in the immediate future, to provide him with greater facilities to extend work along these lines.

The following pages cover only a portion of the events, tragic or comic, which have occurred in the Zoological Park, but they do throw much light on the fascinating question of animal intelligence and its limitations. The result of the studies on intelligence during the past generation shows that the higher mammals differ from man in degree rather than in kind. It is the enormous development of man's brain which separates him by a gulf from the other primates. Man himself exhibits in his various species a wide range of reasoning capacity, in the lower ranges of which the imbeciles and morons are inferior to the anthropoid apes. In fact, the intelligence of the trained chimpanzee corresponds with that of a bright child of three or four years of age.

In the last analysis, the difference between the an-

thropoid apes and men is that the latter keep on growing while the mental development of the former ceases at an early age. To understand man and his brain, it is necessary to observe and study his relations. This is a study to which the writer of the present volume brings his vast experience and trained mind. Disguised in the form of anecdotes and clothed with a charming style, the thread of scientific observation runs throughout the chapters.

MADISON GRANT.

PREFACE

THE study of natural history has always been deservedly popular with all civilized peoples. Its interest, and its value as an incentive to direct thought and as a stimulus to the correct training of powers of observation, have ever held a high place in our educational development. The extent to which the New York Zoological Park is contributing to the education of the millions of America in useful knowledge of the wild animals of the world is to the New York Zoological Society a source of profound satisfaction. No one who has conducted a class of school children through the exhibits of the Zoological Park, and has been nearly mobbed by a threefold group of adults eagerly listening in, can doubt the almost universal interest in wild animals.

The first zoological garden was founded by a Chinese Emperor about 1100 B. C., and appears to have been projected for scientific and educational purposes, since the name has been translated as "Intelligence Park." The Greeks and Romans had collections of wild animals, but these were destined for slaughter in gladiatorial sports rather than for educational purposes. During the Middle Ages royal persons and feudal chiefs maintained various menageries, aviaries and aquariums, and these have been the real origin of the modern zoological garden. In modern times the great London Zoo has been noted for possessing one of the first comprehensive collections of mammals, birds and rep-

tiles. To-day zoological gardens are to be found in nearly every large city of Europe and in many cities of this country, and they form the chief centre of attraction for those interested in the study or observation of animal life.

The zoological garden of the present day is constantly striving to exhibit its animals, or to allow them to exhibit themselves, with the greatest possible degree of naturalness, in surroundings resembling to some extent at least the conditions to which they have been accustomed in their native state, in order that their habits and behavior may be observed, studied and enjoyed. With certain species, however, such an ideal is in conflict with many obstacles, since the questions of comfort, security and sanitation must all be carefully considered in the maintaining of a great zoological park.

The systematic and sympathetic study of wild animals by one possessed of good powers of observation and a reflective habit of mind cannot fail to reveal many traits of character in these animals easily recognized as among the desirable elements of human character.

"In the Zoo" covers a period of twenty-seven years of personal contact with the animals of the New York Zoological Park and represents an attempt to answer many of the questions asked by our visitors concerning the animals and their care in captivity. It is the desire to help those who may seek such information which justifies both the hope and the purpose of this volume.

W. REID BLAIR.

NEW YORK CITY,
August 1, 1929.

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IN THE ZOO

CHAPTER I

THE NEW YORK ZOOLOGICAL PARK

IT often happens that a worthy undertaking is brought to an untimely end for want of vision or lack of support. Fortunately for the great city of New York, the men who conceived and developed the Zoological Park as we know it to-day were men of broad vision and clear understanding as to what a truly great zoological park should be in order that it might come to occupy a worthy place among the many notable educational institutions of the city.

The New York Zoological Park originated with the New York Zoological Society, a scientific body incorporated in 1895 under a special charter granted by the Legislature of the State of New York. The affairs of the Society are managed by a Board of Managers of thirty-six persons. The planning and general development of the Zoological Park are in the hands of an Executive Committee of eight members.

The original impulse and effort for the creation of the New York Zoological Society came from Mr. Madison Grant, then a sportsman, explorer and student of nature. The enabling act which brought the Zoological Society into corporate existence was successfully passed through the New York Legislature by Mr. William White Niles, a member of the Society, who, fortunately, at that time was a member of the Assembly.

Very early in its career the new organization secured the active support of Professor Henry Fairfield Osborn, President of the American Museum of Natural

History, who was then as now one of the world's great zoologists. Professor Osborn, in seeking an expert for the position of Director of the proposed Zoological Park, made one of his important zoological discoveries when he found Doctor William T. Hornaday, who already had a national reputation as an explorer, collector and author, and who had conceived and promoted the National Zoological Park at Washington.

The Zoological Society of New York was chartered for three principal objects. The first object was educational, namely, popular nature teaching through the instructive arrangement of living animals, birds, reptiles, amphibians and fishes, exhibited, so far as possible, in their native surroundings, in a great, free zoological garden and aquarium.

The second object was economic, humanitarian and æsthetic, namely, the preservation and conservation of wild life, especially in North America but in all other parts of the world as well.

When these two primary objects were well advanced and the Society had established its Zoological Park, and later its great Aquarium, it then entered more seriously upon its third chief object, namely, the promotion of zoology through exploration, research and publication.

The New York Zoological Park was projected by the Zoological Society in 1895. After a year of study of all the foreign zoological gardens by Director Hornaday, a preliminary plan was submitted by him and approved by the Executive Committee. The final plan was approved by Mayor Strong and the Board of Park Commissioners in November, 1897. This plan provided for an inner circle of large permanent buildings and an outer circle of large semi-wild natural enclosures, con-

sisting of ranges of from two to twenty acres in extent.

The Zoological Society assumed actual control of the Park on August 1, 1898, and work was commenced on the Reptile House, Aquatic Bird House and the Bear Dens. With the formal opening of the unfinished Zoological Park on November 8, 1899, the entire series of twenty-two installations for mammals, birds and reptiles had been erected by the Zoological Society at the expense of its own treasury. Automatically these became the property of the city as fast as they were completed. Since that date several other buildings have been erected at the Society's expense.

The central ideas were that the Park should be a free institution, developed on a large scale for the benefit of the millions of a great city, and that it should occupy an extensive forest area which should be developed in a natural manner, giving each type of animal as far as possible something akin to its natural habitat.

In order that the Zoological Park idea might be carried out the city allotted to the Society a splendid tract of land in South Bronx Park, consisting of some 264 acres of great beauty and adaptability. A unique combination of hill, forest, meadow, rocks and water found along the Bronx River offered an ideal opportunity for the creation of a Zoological Park dedicated to a representation of wild animal life.

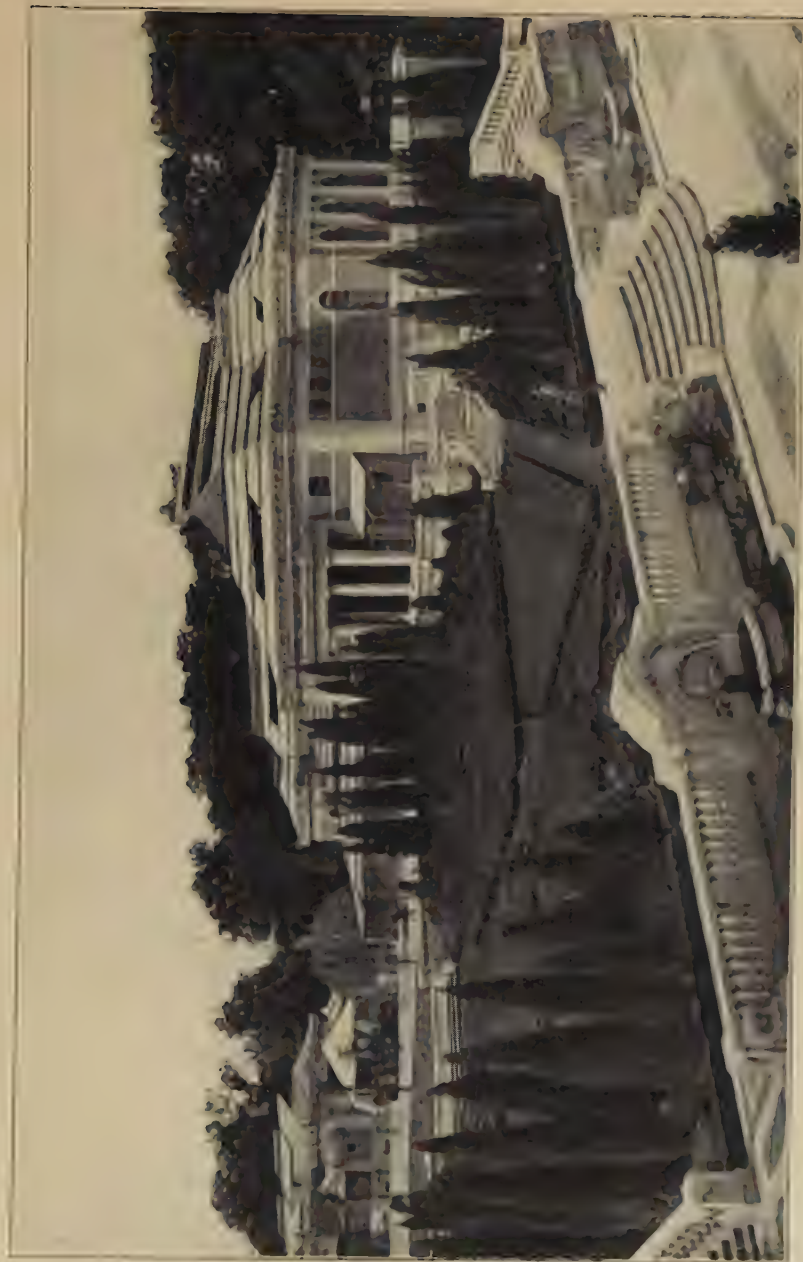
This Park contains about 34 acres of still water, of which Bronx Lake comprises 25 acres, Lake Agassiz $5\frac{1}{2}$ acres, Cope Lake, the Wild Fowl Pond and Beaver Pond together about $3\frac{1}{2}$ acres. The two larger lakes are fed by the Bronx River, which drains a valley about fifteen miles long. The volume of water carried down by the Bronx River is sufficient to keep the lakes well

filled even in the driest seasons. The generous amount of still water provided by the Bronx River affords ample areas for showing the Park's interesting collection of waterfowl and provides a fine opportunity for landscape effects.

Visitors frequently comment on the natural beauty and are impressed with the splendid native forest growth which covers nearly two-thirds of the whole area of the Zoological Park. Among the trees found here are specimens of the black, red, white and pin oak, hickory, maple, beech, cedar, tulip, sweet gum, wild cherry, hornbeam and dogwood, in addition to a large number of trees of other species. The former owners of the plot now occupied by the Zoological Park were David and Philip Lydig, and it is due to their wise care of the trees that this fine forest has been preserved. Many of the trees are very old but the Zoological Society is making every possible effort to preserve them so far as this can be done by skilful foresters. Whenever it is necessary to remove one of the trees another of the same species is planted to take its place. While extensive additional planting has been done throughout certain areas, this has been accomplished without changing the fine landscape features of the Park.

While it is not possible to allow visitors unrestricted access to all parts of the woods, walks such as the Jungle Walk, which runs through the heart of a fine section of the forest, are provided, where they may enjoy the beauty and restfulness of the denser wooded areas of the Park.

The buildings, outdoor dens, cages and ranges have been located and developed to fit into the handiwork of nature. The outdoor animals have been located in



ITALIAN GARDEN, LION HOUSE, AND BIRD HOUSE, THE NEW YORK ZOOLOGICAL PARK

the spots they would naturally have chosen for their haunts. The designer of the Park, Doctor Hornaday, planned the animal installations on the basic principle that "a wild animal that cannot be kept in comfortable captivity should not be kept at all."

The Zoological Park represents a perfectly harmonious joint effort on the part of a philanthropic and scientific organization and the taxpayers of the city of New York. New York has clearly demonstrated the fact that the taxpayer is willing to be taxed in a reasonable way for something that will furnish free entertainment and instruction to his family, and at the same time be a credit to his home city. It is an object lesson of which many American cities might well take heed if it is desired to create and maintain a zoological collection of a size suitable to their population and resources. That end is best attained by a judicious union of private effort, as represented by a zoological society, on the one hand and by municipal support, at the expense of the taxpayers, on the other.

In the city of New York, the New York Public Library, the Metropolitan Museum of Art, the American Museum of Natural History, the New York Botanical Garden, the New York Zoological Park and the New York Aquarium, as well as other important institutions, are built and maintained at public expense, but they enjoy the benefits of non-political administration. The members of these organizations by presenting specimens and by generous donations of money are constantly adding to the value of the exhibits and to the growing prestige of these institutions.

The city provides funds for the maintenance of the Zoological Park but such appropriations are not avail-

able for the purchase of animals or other exhibits, for the carrying on of field work, or for the publication of its scientific research investigations. Appropriations for these purposes are derived from the income from invested funds and from contributions of the friends and members of the Society.

Because of the fact that the Zoological Society has agreed to furnish all the animals to the Zoological Park, the city of New York has agreed that all the revenue-producing privileges of the Park shall be controlled by the Society. All of the profits derived from the restaurants, tea houses, boating, riding animals, sale of photographs and books, and all admission fees, are expended by the Society in the purchase of animals for the Park. It is well that visitors should know that all net profits realized in the Park go directly toward the increase of the animal collections.

In the acquisition of many desirable species the Society has been favored by its friends, both at home and abroad. Frequently it happens that the greatest zoological rarities are obtainable only through the goodwill and tireless industry of friends who travel into the remote and inaccessible regions of the earth. It is to such sources that we owe many of our finest exhibits.

Courses of free lectures are given to great numbers of school children to enable them to better understand the relation of the animals in the Park to systematic zoology. It is a source of great satisfaction to realize that the public officials of New York thoroughly believe in popular education, and that the enormous foreign population which comes to this port enjoys advantages of free and attractive education probably greater than in any of the countries from which they come. The

public and high school system of the city, under the Board of Education, is constantly extending its connection with the Zoological Park and the Aquarium, to the great benefit of all. The system of visiting these great institutions under the direction of teachers is encouraging, and every effort is being made to meet the growing needs of work along these lines.

The influence of the exhibits of the Zoological Park upon those who see them is shown by the great number of educational activities in the form of illustrated lectures, the publication of books and magazine articles, and the countless number of newspaper feature stories that have been put forth among the millions in and beyond New York City. The high quality of wild animal stories now being put into print by the magazines and newspapers of the United States is very gratifying.

Regular visitors to the Park occasionally remark upon the continued supply of interesting exhibits but it is probable that few of them realize the endless round of effort that they involve. In the first place, the quest for new and interesting animals is continuous and far-reaching. The new arrivals and their successful settling in their new homes always cause much work and anxiety. If the exhibits do not compel visitors to exclaim, "How fine your animals look!" you may know that something is wrong.

The Zoological Park is a great popular institution. The attendance for a single year (1928), which constituted a record for this institution, was 2,759,991. The largest attendance in a single day was on June 15, 1924, when 75,802 visited the Park. Since the Park was opened to the public in 1899, to date more than 48,000,000 visitors have viewed our collections.

CHAPTER II

CAPTURING ANIMALS FOR THE ZOO

IN Zoological Park phraseology the word "rare" is often applied to a species whose habitat is difficult of access, or an animal which is especially hard to provide with proper food or to keep alive in captivity. To the general public any animal or bird is "rare" which is odd-looking and comes from some distant part of the world. The giraffe thinks the kangaroo is an odd-looking beast and the zebra thinks the hippopotamus plain-looking, while the Tasmanian devil disdains to associate with the three-toed sloth or the six-banded armadillo because of its belief that they occupy a lower position in the zoological social scale. Some of our zoological prizes are capable of meeting all these distinctions. The various groups have their separate admirers, and from the elephant to the marmoset there is no mammalian family without its circle of friends and champions.

The world has poured into the New York Zoological Park many of its richest zoological treasures, and all in order that the people of New York and vicinity may know by personal acquaintance the best representatives of the vertebrate wild life of the globe. To gather from the remotest corners of the earth a large number of strange and curious animals and render them available to the millions of knowledge-seeking people is a task both pleasing and interesting.

Contrary to a somewhat general impression, the New York Zoological Society does not employ men on salary to travel about over the world for the purpose of cap-

turing wild animals. The cost would be too great, and the results too meagre, to justify such a method. Occasionally, when a rare and particularly desirable species is wanted, a standing offer is made to buy a certain number of specimens at stated prices and under certain conditions. As a general rule, however, most attempts to buy wild animals previous to their capture end in disagreement or disappointment to at least one of the parties concerned. "First catch your hare" is a rule which is as sound in selling animals as in cooking them.

As a general thing, it is necessary for every zoological garden or park to patronize responsible dealers in live animals, and resident collectors. From hard-earned experience they know how to crate and ship animals to the best advantage. Representatives of dealers in wild animals now make expeditions to Africa and Central Asia each year, and in addition special expeditions are sent to other places whenever there is a call for special animals. But for this far-reaching enterprise, the task of stocking zoological garden installations would be far more serious than it now is. Give them your order and they will get any two-footed or four-footed or footless creature you want,—a boa-constrictor, a hippopotamus, a chimpanzee or a giraffe. If it is not in stock they will find it for you,—in Greenland, on the slopes of the Atlas Mountains, or in the interior of Africa or Borneo.

Many of the Zoo's animals are gifts from hunters and explorers. The expeditions of Commander Peary, Theodore Roosevelt, Paul Rainey and "Buffalo" Jones have all enriched the New York Zoological Park by bringing us rare specimens of mammals and birds. The hunting and shooting of many of the big game animals of the world is child's play in comparison with catching

alive some of the wariest and also the most dangerous of wild animals, keeping them alive and successfully transporting them to some zoological garden.

If wild animals were listed upon the exchanges of the world like corn and cotton, we might find our newspapers recording the activities of the market somewhat as follows:

"An early smash in the kangaroo market yesterday, occasioned by the arrival of a heavy shipment of prime kangaroos from Australia, was followed by a sharp recovery and before the end of the day the offerings had all been absorbed by the eastern zoological gardens, and the dealers on the wild animal exchange were talking of \$1,500 aard-varks and \$8,000 rhinoceroses by August."

Various causes determine the cost of the inhabitants of the Zoo. The cost of animals is based upon their rarity, difficulty of capturing, and the expense incidental to their care and transportation from the jungle to the Zoo.

The most expensive animal in the Zoo is the Indian rhinoceros. A young rhino, say two or three years old, delivered in New York is worth about \$8,000. During the late war, giraffes soared amazingly and for a time good specimens were unobtainable. This was because the region wherein the lanky, long-necked animals are usually ensnared was within the zone of hostilities and expeditions could not enter it. Probably the finest pair in captivity to-day is that in the Zoological Park, valued at \$15,000. The market price of good specimens at the present time is about \$1,500 a yard, measuring from the feet to the top of the horns.

An elephant costs from \$2,500 to \$4,000 and a hip-

CAPTURING ANIMALS FOR THE ZOO 11

popotamus of the common garden variety about \$3,000, but for the rare pygmy hippopotamus the market quotation would be \$4,500 bid, with few takers. Zebras are worth from \$1,000 to \$2,000 each; an aard-vark, \$1,500; a duck-billed platypus, \$1,400; a gorilla, \$4,000; a chimpanzee, \$1,000; an orang-utan, \$800; a royal Bengal tiger, \$2,000; lions, \$800 to \$1,200; jaguars, \$500, and leopards from \$150 to \$200 each.

The blue bird of paradise is rare and cheap at \$1,100. An ostrich is worth about \$150. Peacocks can be purchased for from \$50 to \$150 per pair. A 22-foot python, weighing from 125 to 140 pounds, is worth about \$300, if delivered in New York in good health. A 12-foot King cobra will bring \$150 if one can succeed in finding any zoo equipped to care for this dangerous reptile.

Elephants are captured ordinarily by the aid of their tame brothers. The two principal methods in vogue are by driving them into "keddas" or enclosures, or by means of pitfalls. Of these, the first only is employed for the capture of whole herds. A kedda party in India comprises about 300 men, who go out during the winter for a sojourn of two or three months in the jungle.

When a herd of elephants is discovered the party divides and goes off in opposite directions, so as to surround it. When complete, the circle has a circumference of six or eight miles. A light fence of bamboo is rapidly formed round the ring and the animals are kept in by firing shots by day and by lighting bonfires at night. After the first few days, however, if the ring is sufficiently large and contains plenty of cover, the elephants give but little trouble. In the centre of the circle the construction of the kedda or enclosure is then rapidly begun. This is built in a secluded spot and is

formed of massive posts arranged in a circle 100 to 150 feet in diameter, with an entrance of about 15 feet in width. From the entrance proceed two diverging lines of posts which at the termination, 300 feet from the gate, are about 150 feet apart. When all the arrangements are complete, the herd is driven into this funnel-shaped entrance and down into the kedda.

The tame elephants which the men introduce into the enclosure now separate the wild ones, one at a time, while ropes are placed about the neck and one hind leg, after which each animal is led out and secured to trees in the forest, where it remains until sufficiently tamed to undergo further treatment.

The method of capturing elephants by pitfalls is the one chiefly used by the natives in India. The pits are about 15 feet deep and 10 or 11 feet long by $7\frac{1}{2}$ feet in width, this relatively small area being intended to hinder the animal from digging its way out with its tusks. It is remarkable that an animal which displays such caution in venturing over bridges and other artificial structures as does the Indian elephant should so readily fall into these pits.

Years ago almost every Indian rajah had his herd of elephants but now these great animals are growing scarce and recently the Indian government found it necessary to take steps to protect them from extermination. The price of an adult Indian elephant is about \$3,000. Those capable of performing unusual tricks and those of extraordinary size are worth considerably more than that sum. The Indian elephants are the ones commonly seen in zoological collections and in circuses. Being of a high grade of intelligence and quick-witted, they soon learn the customary circus tricks.

Our first elephant "Gunda" was captured in the wilds of Assam, in the extreme northeastern corner of India. This elephant, seven feet in height and weighing over two tons, was shipped from India in a massive box, in charge of Kodah Bux, whom Doctor Hornaday believed to be the laziest and most shiftless native that ever left India's coral strand. Kodah came to stay for three months and was to spend his time in caring for and training this elephant. But by no process known in the Park could he be coaxed or coerced into anything resembling duty; so he was properly tagged and promptly shipped back to India.

The ivory hunters have nearly exterminated the African elephants in most parts of the Dark Continent, but along the upper regions of the Niger and the Congo they are still found.

In the few portions of Africa yet inhabited by wild elephants, conditions are so difficult that the capture of even a baby elephant, its upkeep in the jungle for three or four months, and its successful transportation to the coast for shipment are matters of great difficulty and expense. After the wild animal dealers' agents in the field have captured baby elephants, accidents or death may overtake the animals before reaching the coast, thereby registering a total loss for the venture.

African elephants are far less tractable and, in general, less valuable for zoological exhibitions than the Indian species; but being scarce, they bring good prices, \$2,000 to \$3,000 being the average for healthy specimens.

I wonder how many of the visitors to the Zoological Park who have seen our herd of contented musk-ox appreciate the effort that has been put forth to capture these animals in the remote and desolate regions of the

Far North, keep them alive, and finally bring them to civilization for public exhibition?

The musk-ox is an inhabitant of the frozen North, the land of snow and ice, howling storms and treeless desolation. In 1901 Commander Peary killed a musk-ox within half a mile of the most northerly point of land in the world,—the northeastern extremity of Greenland. How this animal finds food of any kind during the long, dark and terrible Arctic winter is yet one of the secrets of Nature.

Although well-known for more than a century, the musk-ox has been one of the last of the world's large land mammals to be brought into captivity. This has been chiefly due to two causes,—the difficulty of transporting the animals from the Far North to civilization and the universal doubt regarding their ability to survive in the temperate zone. Even under the most favorable conditions, the cost of capturing one of these animals and bringing it alive and uninjured to some zoological park is really great, and no Arctic explorer or hunter cares to experiment for his own amusement. On the other hand, no zoological garden desires to pay \$2,000 for a live animal unless there is a fair chance that it can live a reasonable length of time in captivity.

In March, 1898, Mr. C. Jones, better known as "Buffalo" Jones, made a trip to the Barren Grounds of northern Canada for the sole purpose of collecting and bringing back to the Zoological Park a number of musk-ox calves. Five head were actually caught and driven two days' journey southward. During that time Mr. Jones and his solitary white companion, Mr. George Rea, fought the hordes of fierce wolves which beset them, until nearly exhausted. At last, when the



MUSK OXEN



SNOW LEOPARD

wolves had been left behind and the two hunters finally slept for a few brief hours, a party of Indians stole up and with their knives murdered all five calves—in order that all the other musk-ox of the Barren Grounds should not follow them out of the country!

Danish Greenland has been the source of most of the musk-ox calves that have come to zoological gardens during recent years. These calves have usually been captured by Norwegian fishermen and brought to Europe.

The musk-ox is an animal that will soon disappear as a zoological exhibit because of the increasing difficulty in obtaining permits for its capture. The Canadian Government was the first to adopt practical conservation measures for the protection of the musk-ox and is now making a determined effort to stop the capture of calves, in order to preserve the greatly depleted herds.

Orang-utans, or the Red Apes of Borneo, are dangerous to handle in that their size, strength, savageness and activity render a full-grown one a match for any dozen men when the latter are unarmed. As a general rule the orangs are too wise to enter traps of an ordinary nature, be they ever so cunningly devised, and how the animals are captured alive and uninjured has often puzzled people who have seen them in captivity. The *modus operandi* used by the natives of Borneo is comparatively simple, however. When a "big fellow" is seen in the vicinity of a village, the whole populace turns out at night, armed with unlighted torches, and surrounds the spot where he has last been seen. When the circle is complete the torches are lighted and the ring of beaters slowly converges toward its centre.

Meanwhile, as fewer men are required to fill the line, some advance and start felling trees, always taking care to leave one standing in an open space of about a hundred yards in diameter. This operation may take days and meanwhile the orang-utan will not attempt to bolt during the daytime, while at night he will not cross the line of torches. At last, hemmed in on every side, he makes for the solitary tree which has been left standing. Around this tree a pear-shaped fence or corral is then made with stakes some six or seven feet high, the apex being sharply pointed, roofed in with bamboo bars and arranged with a door similar to that of the familiar mouse-trap, heavy stones fastened by means of rattans to its lower part doing the duty of the customary spring.

Curious to relate, the orang-utan never has been known to leave his solitary tree and cross the fence,—to him a most simple matter. Instead of this, he will remain remote and melancholy in his tree, feeding on its fruit and leaves, until he can get no more. Then and not till then will he go to the bananas or other fruit and water with which the trap is baited. Though the trap is small and strongly built, he would now make short work of it were it not that his captors appear on the scene and with bamboos and rattans bind the erstwhile wild man of the woods securely. Then a cage is built around the trap and when complete, the latter and the bindings are cut away, piece by piece, and Mr. Orang-utan is ready for shipment or exhibition. Unfortunately, unless taken very young they rarely live long in captivity.

Ordinarily, full-grown tigers, lions, jaguars, leopards and similar animals are captured by means of pitfalls.

In order to catch these animals the natives of India and other countries build all kinds of traps and devices, the favorite method being the pitfall. These pits are great holes dug in the ground in the paths leading to jungle watering-places. They are usually made in the form of an iron furnace, wider at the bottom than at the top, and from 15 to 20 feet deep. At the bottom of these pits are strong nets, so arranged that when the hunter's prey falls upon them they will entangle its legs. The tops of the pits are covered over with branches and leaves, and so perfect is the concealment that hunters have met with serious injuries by falling into them.

Despite these elaborate efforts to ensnare the animals, many manage to escape, but usually when the men make their rounds each day, there is something for them to bind and cage for shipment to Europe and America.

"Buffalo" Jones, some fifteen years ago, captured a full-grown lioness near Kijaba, British East Africa, which was brought safely to the Zoological Park. To effect her capture, the lioness was trailed with dogs and lassoed when she came to bay. Some difficulty was encountered in accomplishing this feat, as the lioness displayed great courage in fighting the dogs and men. She took refuge in a fissure in the ground, from which place she was finally dislodged by a common fire-cracker. As she bounded out of the shelter, two ropes were cast over her from opposite sides. A third rope over the bough of a tree raised her from the ground, and a pair of tongs, specially constructed for the purpose, was then clamped over her jaws. In this helpless state the lioness was speedily transferred to a sledge and dragged to camp. When she reached the Zoological Park she still

had an abundance of her fighting spirit, which the long, tedious voyage seemed not to have dampened.

Of all members of the cat family seen in captivity none is more rare and beautiful than the snow leopard of the mountains of central China. The snow leopard is an animal of high altitudes, principally inhabiting the northern slope of the Himalayas. Its home is on the mountains above an elevation of 9,000 feet. While this animal is by no means rare in its native country, still to-day there are but few living specimens in zoological gardens.

Captain Thomas Golding informed us that as many as 2,000 skins of the snow leopard have been brought from the interior to the port of Shanghai in a single year, but not one live specimen ever accompanies them. The distance is too great, and the difficulties to be encountered with a live animal in a cage are too numerous to tempt even a Chinaman to try to surmount them. As a result, the very few specimens that have been seen in captivity have either been brought from the Himalayas down through India, or from western Mongolia, through Russia. Naturally, these animals are costly. The price of a pair of snow leopards delivered in New York is about \$2,000.

In capturing the animals of the cat family it is generally considered better to secure young ones. A number of natives form collecting parties and should they find a lair containing a lioness and cubs, they endeavor to induce the lioness to come out. If unable to capture her alive, they shoot her and then catch the cubs. One plan is to throw nets over the young ones, in which they become entangled. When very young cubs are captured, goats in full milk are obtained and the cubs are

fed by them until they are past the first teething stage and able to eat meat.

Practically all the polar bears on exhibition in zoological gardens are captured while still young cubs, and the securing of them is by no means a difficult task, but the capture of a full-grown male, weighing from 900 to 1,000 pounds, with a rope lasso is quite a different story.

Although polar bears are able to stay in the water for hours at a time, they are not very fast swimmers and are easily overtaken by a motor launch. While they are expert divers, they cannot stay under water very long.

In September, 1910, the late Paul J. Rainey, sportsman and explorer, presented to the Zoological Park two full-grown polar bears which had been captured with rope lassos. These animals were found in Kane Basin, off the coast of Ellesmere Land, well within the Arctic circle, while Mr. Rainey was cruising in that vicinity in his chartered sealing steamer "Boethic" with the famous Captain Bob Bartlett.

The male bear, a huge creature, weighed 880 pounds when he arrived at the Park, and it is doubtless the largest polar bear to have been captured in this manner. He was named "Silver King." After living in the Zoological Park during the past eighteen years, both animals are still in prime condition.

The following account of the capture of "Silver King" is told by the late Paul J. Rainey:

"On Thursday, August 4, we sighted a large bear, which the Eskimos took to be a female but which proved to be the large male bear now in the Zoological Park, swimming among the small broken ice-pans. We lowered the launch and started after him. We had consider-

able difficulty in getting close to him, as he would gain on us very rapidly whenever he crossed over a pan which we were compelled to go around. Finally, however, we succeeded in cutting him off by running between him and the pan for which he was making. Just then a very amusing thing happened. Captain Bartlett, who was steering the launch, was sitting on one side at the wheel. When the bear saw that he was cut off from the pan, he dove and we thought he would come up on the other side of the boat. This, however, was not in his mind, and he came up directly alongside and smashed the boat a terrific blow just about a foot under Captain Bartlett. Bartlett gave one wild jump across the boat, not even taking time to change his sitting position, and landed very neatly on the seat of the other side.

"The bear seemed to have an idea of getting into the launch and we had to punch him away with the boat-hook. Finally we succeeded in roping him, and this time I took good care to leave the rope slack until he had put his forelegs through it, when I took a turn with our end of the rope around a cleat just as the bear was busy climbing out on the ice. In the excitement we had neglected to reverse the engine, and when he went out on the ice he very nearly took the launch with him. To have a 900 or 1,000-pound bear fastened to your launch and dragging you out on the ice, under a full head of steam, is not a very pleasant position to be in. At this time the bear could very easily have gotten into the launch!

"Finally, however, we succeeded in slacking away the rope, got the engine going astern, and gradually started to drag the animal into the water. It was a wonderful

sight to see this enormous brute with a strong rope just behind his fore-shoulders. He would rear on his hind legs, bite at the rope and jump up and down; but the good old Standard Motor in the launch did not go back on us, and we steadily and surely dragged him toward the edge. Finally, seeing that the inevitable was coming, with a vicious growl he plunged into the water and started for the launch. We did not have much difficulty in keeping him out, except when we were turning the launch around and getting it going ahead toward the ship, half a mile distant. The way he churned the water and twisted and surged was really thrilling; but he had left the ice-pans forever.

"We signalled the ship to move into open water, as we needed plenty of sea-room in which to handle our bear, having had all the experience we wanted in the broken ice.

"After we had gotten some 200 or 300 yards away from the pan-ice, the big brute succeeded in getting out of the rope, and I was compelled to rope him again. This time he would not keep his head high enough out of the water to enable me to get the rope over him, so we were compelled to run up close, and hang the noose on the end of the boat-hook. By dropping the noose over his head and carefully allowing it to stay slack until he had gotten one or both legs through, we at last succeeded in getting him fast once more and started to the ship, but not, however, before he had made one or two unsuccessful attempts to climb into the launch. The placing of the noose over his head with the boat-hook had its disadvantages and was rather dangerous, because we were compelled to go very close to the bear.

"We towed him to the ship, swung out the crane, fas-

tened the hook onto the rope and, in the twinkling of an eye, Mr. Green, the mate, had hoisted him high into the air and swung him over the ship's deck. This caused a wild stampede among the Eskimos, who were perfectly familiar with the strength and power of a full-grown polar bear. Willing hands were at the swinging tackle of the derrick, however, and in another moment we had the roaring, raging monster over the hatch of Number One hold. As soon as he had been gently lowered down all hands made a wild rush for the hatch to have a look at our pet.

"We found him surprisingly cool, merely sitting on his haunches, growling and making the champing noise peculiar to bears when angry. The rope was still around him, but no weight being on it, the noose was quite loose and as soon as he moved around it fell off.

"The next day, to my surprise, our captive ate small pieces of bread and meat that were thrown down to him. Then the question arose, how shall we get him into the cage? We needed some of the coal under the bear to keep the ship trimmed. It was a very serious situation, as the fireman did not show any willingness to go down for the coal. At once we set to work to knock our small cages to pieces and build a larger one, some ten feet long and six feet broad and high. We used the iron bars for the door and the sheet iron for the bottom.

"After starving our bear for four or five days, we placed a fine juicy piece of walrus meat and a tub of fresh water inside the cage, and lowered it down to the bear. He started directly in but the sailor who was working the trap-door let it drop too soon and the bear held it up with his back while he backed out.

"This episode seemed to make the bear very angry,

for he jumped upon the top of the cage and found that he could just put his head and forepaws over the edge of the hatch and onto the deck! Again there was a wild stampede of Eskimos, sailors and dogs, for it looked as if he surely would be up on the deck in an instant. In the excitement Michael, the wheelman, left the wheel and for a moment everything was in a state bordering on panic.

"At this point one of the sailors did a very brave thing. He ran up and struck the bear heavily over the head with a deck mop, whereupon, after giving a savage growl, the animal went back into the hold. It was fortunate that he did so, for had he gone overboard in the heavy sea that was running it would have been impossible to have stopped and picked him up, and we would have been compelled to shoot him.

"Immediately we hoisted the cage out, and waited another twenty-four hours, when it was again lowered with a good supply of walrus meat and fresh water, as before. This was quite enough for 'Silver King' (as we had named him) and in he went. Without taking time to untie the rope that held the trap-door, we cut it. The door fell into place and our bear was in his cage. Again the steam winch was brought into play, and we soon had both cage and bear hoisted on deck.

"As the crowd of Eskimos and sailors collected around in front of the cage, the bear made terrible lunges at them and every time he lunged at the bars it was impossible for the Eskimos to stand still. They simply had to break and run.

"Everything went well until we struck warm weather, and started washing him off with the deck hose every morning. Although he had quieted down, this morning

ablution business did not suit him at all and then it was that he made up his mind to get out. The construction of the cage was much too light and on a dozen different occasions he very nearly succeeded in escaping. It was terrifying to see him grab hold of the smooth side of the cage with his teeth and tear out splinters a foot long! This we finally overcame by nailing a board over each hole, with large spikes through it; but 'Silver King' was very clever about biting around those spikes and never, to my knowledge, did he scratch himself.

"One night, during a terrible storm, the cage broke loose and, as the water was running free of the decks, it looked as if he was surely going overboard. The alarm was sounded and the entire crew turned out to help secure the cage. After heaving the ship to and slowing her down a bit, they succeeded in getting on the well-deck and making the cage fast. Another time, while we were at supper, a sailor put his head in at the door and with a respectful salute said, 'Sir, the bear is out!' Some one said, very sensibly, 'Please close the door.'

"It seemed rather dangerous to go down on the well-deck, as it was a very dark night. However, we got some lanterns and hurrying down to the cage we found that the bear really had his head and shoulders out. With the aid of a stout boat-hook we succeeded, however, in driving him back in, and soon had the hole boarded up. After this we always kept a sailor watching the bear, day and night; and I believe we must have driven several thousand nails into the sides of that cage.

"After our arrival at City Island I always kept my big 401 Winchester handy in case of an emergency."

The strength and ferocity of this huge animal ren-

dered its transfer in a flimsy cage from the ship to the Zoological Park a matter attended with considerable anxiety and danger lest the bear should tear its way out of the cage and escape. Moreover, but for the liberal use of chloroform, frequently and judiciously sprayed through the bars of "Silver King's" cage while in transit, the troublesome captive might have earned for himself a tragic end.

As soon as "Silver King" reached the Park he was placed in a temporary den adjoining his present commodious quarters (containing a large swimming pool) until the larger den could be made available. But when it was desired to shift "Silver King," he evinced a decided determination to remain where he was, and although we blocked off the sides with heavy planks, giving him very little room, he refused to leave his quarters. A large juicy piece of beef, fastened to one end of the shifting cage, failed to arouse his interest.

Further efforts proving unsuccessful, it was then decided to try an interesting experiment by bringing "Flip," the walrus, down in front of the den, to see if this would attract "Silver King's" attention. The walrus was very tame and would follow the keeper wherever he went. Waddling after the keeper toward the bear den, the walrus gave a series of grunts and characteristic guttural sounds, which caused "Silver King" to rear on his hind feet and look with interest at the approaching procession. There was no doubt about the bear recognizing his natural prey of the ice floes. As the walrus passed in front of the shifting cage, "Silver King" started tearing at the bars and immediately thrust his head and shoulders into the shifting cage, gazing at the living bait with marked interest. "Flip" was then given

a soap-box as a pedestal, placed directly in front of the door of the shifting cage. Almost immediately after he had climbed on this, the big polar bear hurled himself into the shifting cage, attempting to reach the walrus, whereupon the rear door was slammed down behind him. He was safely in the shifting cage and "Flip" was returned to his own tank, the bear watching his waddling movements with intent and longing eyes.

CHAPTER III

FEEDING CAPTIVE WILD ANIMALS

MANY people seem to feel that food and exercise are timely subjects, and belong only to the era in which we live! Have you ever thought how careless our ancestors were in respect to exercise? The early pioneers who cut down the forests and Indians, and settled the farm lands of North America never seem to have taken any exercise. They apparently knew nothing of the value of deep breathing, or of the advantage of lifting the left knee up to the chest five times every morning before breakfast.

Regarding food, the mental state of our ancestors was appalling. They were ignorant of vitamins and calories. They ate pancakes, oatcakes, johnnycakes, mince pies, ham sandwiches, doughnuts and dog biscuits under the silly impression that such things are food. We have only to consult a modern scientific book on "Diet and What It Does to Us" to realize that they are not.

Catering for a large and finicky zoo family is a matter of diplomacy as well as one of dietetics. Where your list of boarders includes lions and ostriches, elephants and squirrels, aard-varks and wart-hogs, giraffes, camels and monkeys, there are numerous peculiar complications added to the price of bananas and the age of eggs.

The specimens on exhibition in the New York Zoological Park number about 550 mammals, 2,500 birds and 400 reptiles. While these figures vary somewhat

each year, they represent the average number of animals found there at all times.

What do they eat? When do they eat, and how much? What does it cost to feed them? These and similar questions are the ones frequently asked by many of the two and one-half million visitors to the Zoological Park each year.

The food consumed by the mammals in this huge boarding-house each day includes the following:

250 pounds of beef.	36 bunches of carrots.
50 pounds of fish.	450 bananas.
175 loaves of bread.	150 apples.
1 ton of hay.	50 oranges.
15 bushels of grain.	10 pounds of prunes, raisins or dates.
200 pounds of mangels.	25 pounds of boiled rice.
100 heads of cabbage.	25 quarts of milk.
2 barrels of potatoes.	

In addition to these items, seasonal fruits and vegetables, cocoa, malted milk and zwieback are a few of the extras necessary to keep these animals contented and happy. A zoo on a large scale has an enormous appetite. The food bill for all the animals averages approximately \$45,000 a year.

The work of various investigators in the study of vitamins and food products during the past few years has added enormously to our knowledge of the science of metabolism and nutrition, a knowledge which is essential to an understanding of practical dietetics when applied to a large zoological collection of living animals gathered from all parts of the world and set down in New York City.

The Zoo's kitchen, where much of this food is prepared, is not unlike the modern hotel kitchen. Here

is a combination diet kitchen and butcher shop. It has its gas and coal ranges, kettles, steam food-boilers, fireless cookers and two large refrigerators, one for fruit and vegetables, the other for meat, milk, eggs and other perishable food products. The kitchen is in charge of an experienced chef, who not only prepares all the regular food for the animal guests, but also caters to the individual whims of the most fastidious among them.

The New York Zoological Society having assembled many animals from different parts of the globe, finds it often impossible to furnish exactly the same diet to which they have been accustomed in their natural habitat. For many species the diet is necessarily artificial, and experiments are constantly being made in order to determine what satisfactory substitutes can be supplied that will take the place of the natural food, and at the same time appeal to the animal's taste.

For instance, in the case of certain African antelopes, we have been able to devise a kind of forage biscuit, made of a mixture of bran, oats, corn, molasses, bone-meal, salt and other minerals. The mixture is pressed into cakes about the size of a dinner plate, an inch in thickness, and then baked. The animals are fond of these biscuits, and the ration has the advantage of being dry and easily stored, while the brittleness insures the animal's thoroughly masticating the food before swallowing it. Each cake represents the equivalent of about three quarts of grain. It is especially good for giraffes and different species of antelopes, which are generally delicate feeders.

Inspected beef, of the same grade as is eaten by the people of New York, is fed to the lions, tigers, leopards and other members of the cat family. The food of these

big cats is lean raw beef, since they refuse to eat cooked meat, their daily portion consisting of ten to twelve pounds each. These animals are rapid feeders, and occasionally suffer from indigestion. To compel them to eat more slowly, the bone is left in the meat, the fastest eaters getting the boniest portions.

These animals are fed only six days a week, Sunday being a fast day for the benefit of their health. It will be remembered that in their wild state these big cats are often obliged to go several days without making a "kill," and would periodically fast, under the dictates of nature.

In the case of the smaller cats like the pumas, lynx, ocelots and wild cats, their meat is cooked or thoroughly steamed. To prevent those cats which eat only a small quantity of food from swallowing their meat in chunks, the meat is put through a grinder. Some of the smaller cats are fed with fish, which although not cooked is always carefully cleaned.

A considerable quantity of cod-liver oil is given to the cat animals during the winter months, for in addition to being a valuable food it is also a great aid in keeping the digestive organs in condition.

All the carnivorous animals that can be induced to take cooked food are given it. The wolves, coyotes and foxes are fed cooked beef, mutton and specially prepared biscuits consisting of compressed cakes composed of beef-blood, meat, bran and grains, hardened by baking. This hard food cannot be eaten without complete mastication, and it supplies the elements that have been found necessary for these animals.

Next to witnessing the feeding of the lions and tigers, the visitors to the Zoo are most interested in, and get

most amusement from, watching the feeding of the monkeys. Closely resembling man in many particulars, they are like him also in the matter of appetite, for they are fastidious to a degree, and gluttons as well. Because they are susceptible to so many ills of the human animal, they are delicate and especially hard to rear. They naturally require bananas, oranges, apples, grapes, dates and various nuts; but the simian appetite also demands variety and takes readily to new articles of diet, so that, in addition to the more or less native foods, they get boiled potatoes, carrots and onions, bread, milk, cocoa and boiled rice with raisins.

The Howling monkeys from South America are rarely seen in captivity, chiefly because of the fact that they are notoriously "poor feeders." These animals not infrequently die from malnutrition and starvation, when the internal organs show no trace of actual disease. It has only recently been possible to keep a Howler in captivity more than a few months, principally because we never seemed to be able to find the food which the animal would accept.

By constant experimenting and sympathetic interest on the part of the keeper it is often possible to discover the food substitutes that will tempt the appetite and at the same time satisfy the food requirements. At other times, the successful combination of food is discovered by accident. A desperate but sympathetic keeper discovered that an emaciating red Howler exhibited marked interest in some wistaria blossoms growing just outside its window. In offering these blossoms, the keeper was astonished to find that the animal consumed them with evident relish. This led the keeper to offer other flower and fruit blossoms until finally the animal was eating

a considerable quantity of grape and apple leaves, as well as those from the sweet gum, oak and Japanese red maple trees. When his appetite was stimulated by these substances, we found that we could get him on a more or less civilized diet consisting of seasonable fruits, such as grapes, cherries and plums, lettuce, bananas and oranges.

The bears are natural-born clowns and love to perform before an audience, so that at their feeding hour there is sure to be a crowd waiting to see them fed. Each bear disposes of about four to six loaves of bread, a dozen apples or carrots and a few ears of green corn or a head of cabbage, and twice each week they receive four to six pounds of raw or cooked beef, just as they prefer.

The problem of finding a proper food for the herbivorous or hoofed animals, such as the elephants, rhinoceroses, hippopotami, elk, deer and the like, is more serious. The handling of the enormous amounts of native foods, like grass, hay, grain and vegetables, which these animals require; the storage, preservation and mixing of them would be a very troublesome task. For instance, our farm raised more than thirty tons of one kind of vegetable,—mangels, a beet-like tuber,—which were consumed by the animals in one year.

These difficulties have been overcome by preparing a concentrated food, much like the biscuits made for the antelopes, except that they are larger in size and differ somewhat as to ingredients. From six to eight of these cakes make a meal for a large animal, and their very hardness and dryness compel the animals to chew them long and thoroughly. Along with these cakes the animals get a certain amount of hay in bulk, and at times they get bran mash.

A full-grown elephant will daily consume about 150 to 200 pounds of hay, 35 heads of lettuce, 50 pounds of cornstalks or green vegetables, and 15 loaves of bread. When our baby pygmy African elephant "Tiny" reached the Zoological Park, she was less than four feet high but her appetite was by no means small. She daily consumed forty bananas, six oranges, twelve apples, two pounds of prunes or dates, six loaves of bread and two gallons of milk, but she ate only a few pounds of hay. Since that time there has been no diminution in her appetite and she may still be considered an expensive boarder.

"Pete," the hippopotamus, spends most of his time in his huge tank, but at the dinner hour he waddles out to his dining-room and opens his mouth just as wide as it will go. All the keeper has to do is to present "Pete" with about six large heads of cabbage, a dozen bunches of beets or carrots, several quarts of apples, and ten to fifteen loaves of bread. For dessert he is usually content with 150 pounds of timothy hay.

The sea-lions and seals are chiefly responsible for our large fish bills. The sea-lions, especially at the feeding hour, never lack an audience, and it is doubtful if any group of animals afford more constant entertainment, because they are nearly always found "showing off." Looking at the animal in a state of rest, one can have no conception of its startling agility in the water. The happy "Honk! Honk! Honk!" call, beginning at two o'clock and continuing until the arrival of the keeper with his pail of fish—principally butterfish and herring—can be plainly heard throughout the Park. Each animal receives seven to eight pounds of fish. That is the daily ration for each animal, but just how much more they would eat I am unable to say because I have never

known a sea-lion to appear satisfied with his allowance.

The certainty with which the sea-lion catches the fish thrown to it is really remarkable. The fish are caught on the fly and dexterously juggled into position and quickly disappear down the animal's throat head-first. They swallow large fish as if they were gulps of water, for sea-lions' teeth are small and sharp, adapted principally for securing their prey and not for mastication.

Some of the boarders at the Zoo have finicky appetites, which are often expensive ones to cater to. The Paul Rainey Arctic expedition some years ago presented the Zoological Park with a young Atlantic walrus, which required more care and attention than all the elephants combined. "Flip" weighed only 150 pounds upon arrival at the Park, but for some time he gained at the rate of 25 pounds a month. His regular food consisted of 20 to 25 pounds of soft-shelled clams (in season and out of season), supplemented by a small quantity of fresh codfish from which the bones had to be removed. He had to be fed three times daily, and it took considerable time to prepare 20 to 25 pounds of clams. Also, his bath had to be salted to the same density as ocean water, otherwise "Flip" would develop an irritating skin disease.

Some years ago we received a duck-billed platypus from Australia, the first ever to reach America alive, for which we paid the sum of \$1,200. This is one of the strangest living creatures, a sort of missing link between bird and mammal. This remarkable little animal only weighs about two and a half pounds and is about the size of a muskrat. It has the peculiar faculty of laying eggs, but suckles its young. It has a flat bill like a duck, the body is covered with fur like a beaver, and

its tail also resembles a beaver's in form, except for its fur covering. It has webbed feet and lives in rivers, but sleeps in burrows in the banks.

Our specimen dined upon angle-worms, grubs and small shrimps, of which it consumed nearly half its own weight each day. Many Bronx boys have regretted the passing of our platypus, since they found it profitable to collect and deliver worms and grubs at a liberal price per dozen. Its daily diet was one-half pound of earth-worms, forty shrimps and forty grubs, all of which cost us between four and five dollars a day to acquire.

The echidna, like that other egg-laying mammal, the duck-billed platypus, presented a difficult dietetic problem to solve. Echidnas are mainly nocturnal in their habits, frequenting rocky districts of Australia, and subsist almost exclusively on ants and their eggs. When this food is not obtainable they will eat worms and insect larvæ. They obtain their food by digging up the ants' or termites' nests with their powerful legs and curved claws,—a combination forming remarkably effective excavating implements.

After some experimentation our cook found a combination of egg custard, finely chopped raw beef and sweetened condensed milk which finally satisfied the echidna, as well as the keeper.

The sloths are included among the Edentates or toothless mammals, apparently because no other Order was willing to admit this helpless freak of nature to membership. They are not really toothless but have five pairs of teeth in the upper jaw and four in the lower. They inhabit the forests of South and Central America, where vegetation attains its highest development. They are nocturnal in their habits and are generally found in

the tops of low trees at the water's edge, hanging upside down, and they seldom descend to the ground. While practically helpless on the ground, the sloth's movements even in the trees are slow and deliberate, denoting extreme caution. They cannot be hurried and never will loosen their hold on one branch without first securing themselves to the next. To the sloth the gait of the tortoise must seem like speeding.

The food of the sloth in captivity consists of bananas, rice and leaves of various kinds. They seem capable of enduring long fasting without harm. I have known them to go without food for more than a month.

The giant ant-eater's food was a problem in dietetics for a while, until we worked out a formula for a food combination that would take the place of its natural diet of live ants. At home in South America this animal gains its food by raiding anthills, which are plentiful. The ant-eater has a tiny mouth with a tongue which resembles a rat-tail file more than a tongue, and which he can thrust out of his mouth to a length of about ten inches. The tongue is covered with a gummy substance, and he literally licks up his meal by running his tongue into the anthill and devouring the unlucky insects which adhere to it. After much experimentation to find the right food combination, we found that raw eggs, very finely chopped raw beef, and milk, all thoroughly mixed, delighted the ant-eater's palate and furnished the nourishment required.

The aard-vark (African ant-pig) is one of the rarest animals ever exhibited in the Zoological Park, and our specimen has been the only one of his species ever to reach America alive. It is a plump, pig-like animal, weighing 160 pounds, with short powerful legs, with the

toes covered with strong nails. The body is almost naked, and heavy; the head greatly elongated, with a small tubular mouth, and a somewhat pig-like snout; the ears of enormous length, and the tail thick, cylindrical and tapering, somewhat resembling the tail of the kangaroo.

The aard-varks are essentially nocturnal and burrowing in their habits, very shy, and they feed exclusively on ants and their eggs. In its natural habitat the aard-vark burrows into the sides of the ant-heap, and the inmates are abstracted by means of its long and sticky tongue.

We have found by experiment that the aard-vark can thrive on a mixed gruel composed of cornmeal, milk, eggs, finely chopped raw beef, and insect food, such as fried ground beetles, grasshoppers, and ants' eggs. These insects we have been able to import from Africa.

I have specifically mentioned the food of certain rare species, in order to give some idea of the complicated aspects of our food problem.

"Buster," the 300-pound, three-hundred-year-old giant land tortoise from the Galapagos Islands in the Pacific, has been a steady boarder at the Zoo for twenty-five years and has never missed a meal. He is pretty slow coming to meals, but when he gets there he is not slow in disposing of the cabbages, lettuce, watermelons and bananas which constitute his food.

The feeding hours are arranged so that the visitors may be able to see a large group of animals fed, in an afternoon's visit. The hoofed animals such as the buffalo, elk, deer, sheep and goats are fed during the early forenoon. The elephants, hippopotami, rhinoceroses and tapirs are fed at 1.30 P. M.; the lions, tigers and leopards

at 2; the monkeys at 2.30; the sea-lions at 3 and the bears at 3.30.

We formerly had a great many digestive disorders among the animals as a result of over-feeding by visitors, but by vigorously prohibiting the public from giving the animals tidbits, and by regulating each animal's supply of food according to its physical condition and the amount of exercise it takes, these troubles are now held in check.

A few of the visitors to the Zoological Park feel that the keepers are unnecessarily zealous in enforcement of the rule against the feeding of animals. Perhaps a few have even felt offended because they were admonished not to show their interest in certain animals by the bestowal of candy, peanuts, tobacco and other deadly tokens of regard. A wild animal in captivity naturally supposes that anything offered him by a human being is good to eat; and many a valuable captive has offered up his life on the altar of misplaced confidence.

With regard to the feeding of our animals by the general public, we feel much as the fond mother does when her young children are fed sweets between meals by the kindly disposed visitors to her home.

The animals in the Zoo, placed there for the instruction and pleasure of visitors, are much too valuable to permit of indiscriminate feeding by kind-hearted friends.

CHAPTER IV

BABIES OF THE ZOO

IN a zoological garden the list of births among the mammals affords a very good index of the general health and condition of the collections. A long and varied list of births is one of the best indications that a healthy environment has been established.

The breeding of animals, aside from the hoofed stock, never has been with us an important factor, chiefly for the reason that the demands for exhibition and educational purposes are so imperative that all other conditions have been of secondary consideration. The successful breeding and rearing of captive wild animals on any considerable scale requires special provision to afford the seclusion and enlarged quarters that would insure satisfactory offspring. The providing of quiet, comfortable and sanitary quarters with proper isolation cannot be satisfactorily arranged in a Park like ours, where the animals must be constantly on exhibition to thousands of visitors each day. When one remembers these conditions, and the absence of the many factors deemed necessary for the propagation of offspring among the rarer species of our wild animals, the fact that we have succeeded in breeding the chimpanzee, baboon, giraffe, camel, eland, Rocky Mountain sheep and goat, Siberian tiger and other rare species should be considered the more noteworthy.

When it's May it's stork-time in the New York Zoological Park. To Keeper Quinn, who has charge of the herds of elk, European red deer, fallow, axis and Asi-

atic deer, May is the month of mingled joy and anxiety, with congratulations always welcome and in order. This keeper's success with animal babies has been such that, with but one or two exceptions, the numerous animals comprising these herds have been born in the Zoological Park and, in addition to those now here, many have been sold to other zoos throughout the United States.

Animal mothers, like human mothers, vary in temper. Some are devoted to their offspring and some are not. Some of the animal mothers are even charitable enough to adopt the deserted babies of others. It is not unusual to see a mother elk or deer caring for a deserted fawn of another in addition to her own offspring.

Occasionally we are obliged to foster some helpless wild animal baby when the mother has abandoned it because of illness, or as the result of some physiological change in the function of the milk-secreting glands. Such a baby the keeper must adopt and bring up by hand if there is no mother of the same species to adopt it. Armed with a nursing-bottle filled with modified milk or a patent baby food properly diluted to the peculiar needs of his charge, the keeper becomes a nurse in earnest, and often a most successful one. He must not only take care of the deserted foundling, but he must also take care of the orphans acquired by purchase, often young animals only a few weeks old. These frequently grow to maturity strong and vigorous. In fact, many of the wild animals exhibited in the Zoological Park were born there and are bottle-fed babies now grown to maturity through the intelligent efforts of their keepers.

Of all the hundreds of wild-animal babies I have seen ushered into the Zoological Park I cannot recall



FIRST AID TO BABY MOUNTAIN-LION



HERE! FAWN FEW HOURS OLD, HIDDEN AWAY BY
THE MOTHER

a single one that to me, or to the mother, appeared really homely. Of course some are better-looking than others, while some babies, like the axis deer fawns and South American tapir, are positively handsome. Perhaps I should modify this statement and except the baby of the Tasmanian devil, which once made its appearance in the Small Mammal House. I feel sure that the mother devil, while she herself could hardly qualify in a beauty contest, must have been greatly disappointed when she first saw her offspring and must have exercised a considerable degree of charity in deciding to keep it.

Some one has said that the hippopotamus was "plain-looking," but surely such an observer was referring to an adult hippo and had never had the opportunity of studying the features and conformation of a few-hours-old baby pygmy hippo. To even insinuate that one of our nine-pound baby hippos was "plain-looking" would be a grievous insult to Keeper Thuman and might even result in serious consequences to the tactless spectator.

One of the handsomest babies of the Zoo is the six to eight pound baby tapir. Its color is entirely different from the sober gray hue of the mother tapir, Nature having decorated this tiny little creature with a bewildering number of light stripes and dots, upon a dark chestnut background. At the age of six or seven months these markings gradually disappear. The mother tapir is a proud but docile parent, and never takes offense at the keeper, who loves to "show off" the baby to admiring visitors.

All the babies of the elk and deer family are more or less covered with white spots at birth but, with the exception of the axis deer, these spots fade out within a

few months. The axis deer carry their brilliant white markings throughout life. As soon as the fawn is born and gets upon its feet it is guided by its mother to a clump of bushes, leaves, tall grass, or even to a crevice in a rock, where the mother forces it to lie down and where it remains concealed for the first twenty-four hours. The fawn lies like a dog, with its nose to its tail, and will not stir or lift its head the whole of a day. It might be supposed that such a brightly-colored animal would be very conspicuous, but this is far from being the case. When it moves, few animals are more difficult to see in a forest. The color of the skin harmonizes with the dead leaves and grass, while the white spots are indistinguishable from the little flecks of light caused by the sunshine filtering through the leafy branches. Although she separates herself from the young fawn the mother, however, does not lose sight of its welfare and is ready to go to its aid in case of need. The elk mother is particularly brave in the defense of her offspring.

Mountain Sheep Hill, with its thriving families composed of African aoudads, Sardinian mouflon and Himalayan tahr, is well worth a visit just to sit on a bench and watch the happy play and antics of the tiny young kids as they run and jump about the rocks. These wild babies are prime favorites with the thousands of school children who visit the Park with their teachers during the spring months.

It was formerly believed that bears would not breed in captivity, but that was before the establishment of the New York Zoological Park, where modern methods of treatment and care have disproved this notion, as well as other erroneous impressions concerning wild animals.



YOUNG GORILLA



YOUNG BAIRD'S TAPIR

Of all our wild animal babies, there are none quite so popular as the little bear cubs when they emerge from their den in the first warm spring days. It is doubtful if any other wild animals have the same fascinating power to amuse our millions of visitors. They are exceedingly playful, and their antics, skylarking, standing on their hind legs, wrestling and boxing and chasing each other about the den, always furnish a very amusing performance.

"Cache," a Russian brown bear, has presented the Zoological Park with many litters of cubs, usually in perfect form. She was an ideal mother in all respects and maintained discipline by occasional vigorous cuffing with her strong right paw.

"Czarina," a Syrian bear, was another good mother and one from whom much of our knowledge concerning the ways and manners of cubs has been gained. She once gave birth to two cubs in an exposed corner of her den. For some unaccountable reason she had for years avoided her sleeping compartment. The arrival of these babies during the very cold January days presented to us an unusual problem because it seemed that the helpless little creatures would surely perish from the extreme cold. Since we could not induce Czarina to go into the sleeping compartment, which was nicely fitted up with clean straw, the next best thing to do was to build a shelter over the mother and her cubs.

While it was at first intended to build a mere rough protecting shelter, when completed it developed into a substantial house. Boards were fastened against the bars at the corner of the cage and then we proceeded to house Czarina in by building a roof over her, and boarding up the front of the triangle. A waterproof covering

was afterward added and Czarina appeared well satisfied with these arrangements, and she remained thus confined until early in April, when the young emerged from the house. The front of her house was then removed and late in April the entire structure was taken down. A few days later, during a cold rainstorm, Czarina with her cubs sought shelter in the comfortable sleeping den which she previously had refused to occupy.

Once, when one of her cubs escaped through a six-inch opening in the overhang bars of the den and later was captured by a keeper, it made such a noisy resistance that Czarina was aroused to fury and the keepers dared not open the gate of the den to return the cub. Accordingly, it was loosely wrapped in burlap and lowered into the cage by means of rope tackle.

The bear cub at birth is a helpless little creature, only eight to nine inches long from the tip of its nose to the end of its much abbreviated tail. It weighs only about fourteen ounces and the body is covered with short gray hair of exceedingly soft texture. The ears and eyes are tightly closed. When it is realized that one of the adult bears weighs from 450 to 500 pounds, it can be readily seen how ridiculously small is a bear cub at birth. Its size is much less in proportion than the young of any other animal, with the exception of the kangaroo or some other marsupial. The cub represents about 1/500th of the mother's weight, as compared with a fawn which represents about 1/30th, a young puppy 1/25th, or a human baby 1/20th of the mother's weight. But in these tiny creatures we see a wise plan of Nature. The cubs are born during the winter, usually in January, while the mother bear is denned up and in a hibernating state.



"CZARINA" AND CUB ON THE TOP OF THE DEN



"CZARINA" AND CUBS

The cubs are suckled for about three months before they make their appearance outside the den.

In the kangaroo colony more than fifty kangaroos and wallabies have been bred, until to-day the Park has the finest collection of these interesting marsupials or pouched animals to be found in captivity anywhere. As a result of Keeper Riley's close observation, we have learned much concerning these remarkable animals, and particularly concerning the matter of the kangaroo's birth, which has remained somewhat of a puzzle to zoologists until recent years. The young are born in a comparatively rudimentary condition, and are sheltered during their development in a pouch called the marsupium, which is a fold of skin on the abdomen. A kangaroo at birth weighs about 20 grains, is a trifle more than an inch long, and not much thicker around than a lead pencil. It is a tiny, pinkish, naked mass and with the exception of the perfectly formed front legs, bears but slight resemblance to the adult kangaroo. It is by means of these front legs that it finally succeeds in propelling itself to the pouch, where it undergoes its more mature development and where it remains attached to the teat for several months. It is completely developed and ready to leave the pouch after six months, when it is permitted to shift for itself. It continues, however, to use its mother's pouch for a longer period as a safe haven in case of fright.

Some of our wild animal babies, like many of the deer, sheep and goats, are able to follow at the side of their mothers half an hour after coming into the world, while others, like the camel, giraffe and zebra, often need assistance and must be lifted to their feet in order that they may nurse. However, after two or three meals

the baby camel is capable of navigating about in its uncertain and ungainly way.

Of all the exasperating mothers in the Zoo family, I believe the handsome lioness "Judy" was entitled to be "crowned queen." She once presented the collection with three fine babies, to the delight of the keepers and others. "Judy," however, considered this a huge joke on everybody, including herself. Even on the first day of her babies' arrival she proceeded to amuse herself with them instead of doing as a dutiful mother should—stay in her maternal bed and nurse them. She insisted on carrying them out to the front of her cage to show them off to visitors. When they cried she would lift one of them up by the scruff of the neck, or even by the tail, and swing it about and then deposit it on the floor and bat it about with her paws, and otherwise treat it in the same manner in which a domestic kitten might play with a half-dead mouse. A keeper was placed on guard in order to prevent "Judy" from maltreating her offspring, but in spite of everything that could be done she persisted in her rough treatment until the cubs finally died from sheer exhaustion and neglect. After the removal of the dead cubs "Judy" exhibited not the slightest degree of concern or remorse.

In sharp contrast to "Judy," our lioness "Bedouin Maid," who lived for many years in the Park, was an ideal mother in every respect and successfully raised a number of litters.

Lion cubs at birth weigh about two pounds. They are reddish-brown balls covered with black spots which fade as their coats grow yellow. At two months they weigh about ten pounds. The mother feeds them almost constantly for the first few weeks and keeps them clean by



KANGAROO WITH YOUNG IN POUCH

washing them with her broad tongue many times a day. In some cases large dogs or goats are engaged in anticipation of the necessity of providing foster-mothers for neglected or orphaned lion cubs. At first the dog may be uneasy at the somewhat rough foster-children but they gradually grow fond of each other.

The arrival of a baby giraffe born in captivity is hailed as a feat in animal breeding and is usually the leading topic of conversation about the Zoo for at least a week after such an arrival. Our pair of giraffes, Romeo and Juliet, have during the last few years presented the Zoo with three fine babies and the local newspapers have given space to the record of these events and have kept their readers informed regarding the condition of the youngsters from day to day.

No one who has ever seen a one-day-old giraffe baby can fail to be astounded by its large size and general appearance. The giraffe calf, like other ruminants, comes into the world with the eyes open. The skin of the body is marked with the large angular patches as distinctly at birth as is the adult animal. Within five minutes after birth the youngster usually makes several efforts to rise but the vacillating legs are unable to support the long neck and head and extremely heavy body. All of our giraffe babies have required assistance to gain their feet for the first nursing by the mother. This is done by stretching a wide piece of canvas underneath the animal's body while the keepers lift the baby to its feet and support it there for a few minutes. After the baby has nursed once it is generally able to navigate without assistance. After twenty-four hours it is usually found gambolling about the compartment in playful mood.

Soon after the arrival of our first giraffe baby I was

standing in line before the depositors' window in a local bank. I was recognized by the bank guard, who approached and said, "How is the baby, Doctor?"

I replied, "Fine."

"How much does it weigh?"

"About 130 pounds and it's 5 feet 7 inches tall."

By this time some of the men and women in the line were showing much interest in the conversation and it was amusing to note the puzzled expression on the faces of many of them. One man, whose curiosity could not be appeased, later asked the guard, "What kind of a baby has that man got?"

One of the most amusing babies ever born in the Park was a Japanese red-faced monkey. The mother was a gentle, friendly, docile animal but the father, "Jake," was a dangerous and aggressive individual. For several weeks after this baby was born it never left the arms of its mother, where it clung tightly to the long hair of the chest and abdomen. The mother and baby were carefully guarded by the vigilant "Jake." Later, the mother permitted the baby to leave her arms but if it wandered a few steps from her side she followed at once, and at the slightest demonstration by a visitor toward her cage she would reach for the baby and clutch it closely to her breast, all ready to retreat, while the father would fly at the cage front, exhibiting savage rage toward the visitor by gripping the cage front and shaking it with all his strength, and finally placing his hand in his mouth and biting at it, evidently intending to demonstrate what he would like to do to the visitor if he only had an opportunity.

Once, five baby lemurs were born in the Monkey House within a period of two days,—an unprecedented



LEMUR WITH TWO BABIES



ORANG "DOHONG" AND CHIMPANZEE "POLLY"

event which naturally crowded the facilities of the nursery. On the morning of the second day the keeper found that one of the mothers had deserted her baby, and that another had adopted it, caring for it with her own, carrying one in her arms in the usual way and the other on her back, without a shadow of partiality.

On July 14, 1920, there was born in the Primate House a chimpanzee baby. The arrival of this baby is noteworthy because it constituted the record of the second chimpanzee ever born in captivity, and naturally this event attracted world-wide interest among anthropologists and scientists generally.

Both parents of the baby are unusually large and well developed chimpanzees, such as rarely are seen in captivity. Suzette, the mother, was acquired in March, 1918, when she was about eight years of age. She was three feet, ten inches in height and weighed 130 pounds at that time. She had been trained on the vaudeville stage and for two years had been an accomplished performer. She gave some remarkable exhibitions of "trick" bicycle-riding, roller-skating, trapeze performances and other feats. Owing to her great strength and at times an erratic disposition which made her difficult to handle on the stage, she had been retired from theatricals a short time before the Zoological Society purchased her from her trainer.

Boma, the father, is an unusually fine and vigorous chimpanzee, standing three feet, eight inches in height and weighing about 145 pounds. Owing to his untamed and wild spirit, no effort has ever been made to train him in any way. Even at the age of seventeen years, after being in captivity fourteen years, he still resents undue familiarity.

Following is a daily record of events relating to the birth of the baby chimpanzee.

On July 14, 1920, about 10.45 A. M., while passing through the Primate House, Keeper Palmer reported that the chimpanzee Suzette had not eaten her breakfast, and upon going to the outside cage to examine her we found her lying on her back. She had apparently just a moment before we reached her given birth to a baby. The baby was lying on the mother's abdomen, face downward, and covered by the hands of the mother. Because of the fact that the event occurred several weeks before it was expected, no one was present at the critical moment save Boma, the father. Boma had been with Suzette in the outside cage for about an hour and when I found him he was sitting, apparently unconcerned, about twenty feet from Suzette.

Boma was allowed to enter his own interior cage while Suzette, with her baby tucked into her left groin and clinging to her hair, was quietly returned to her own cage. Here two bundles of fresh straw were provided, out of which she at once made a comfortable bed for herself and infant. In walking from the outer to the inner cage, Suzette walked on her hands and right foot, keeping the left leg flexed upon her abdomen, with the infant's head appearing at the anterior point of the hipbone.

When moved to the inner cage, Suzette was very quiet and docile and soon settled down in her bed. Upon hearing Boma in his cage she became restless and started several times as if she wished to join him. When offered food she ate hungrily. As Suzette made her bed close up to the front bars of the cage, an opportunity was thus offered to study the appearance of the baby whenever its mother uncovered it, which she did frequently.

When first seen in the outer cage it was feared that the baby might be premature, but on a closer view it appeared normal in every way. There was an abundance of thick hair on the head and that was parted in the middle as neatly as though it had been combed. There was also hair on the shoulders and arms as far down as the elbows. The eyes were wide open, brown in color, and had the appearance of being able to see. The standing height, estimated at birth, was sixteen inches; weight, three pounds. The more accurate measurements, made when it died nine days later, showed the estimated weight and height as approximately correct. The baby was active and clung to the hair of the mother's abdomen. In lying down on her side, Suzette always shifted the baby to the upper side. She handled it very gently and always changed it from side to side by first supporting the head and lifting it.

Being present when the baby made its first sound or cry, I was able to note the effect of this on Suzette. While she was half-reclining and busily engaged in eating her first meal after the baby was born, the baby uttered a low, plaintive cry, the sound of which caused Suzette to stop eating and to sit upright and listen, with a startled expression on her face. When the cry was repeated she looked down at the baby and then hurriedly began making her bed anew, fussing with the straw and shifting the baby from the right to the left groin.

Whenever Suzette would lie down without shifting the baby to the uppermost groin, the slight pressure exerted on the baby always made it cry. This was always a signal for Suzette to hurriedly sit up, shift the baby, and rearrange the straw bedding. During these times the baby often grasped some of the straws in its

hands or feet, but Suzette would always take them away, not by pulling the straws but by gently opening the hands and taking the straws out of them, carefully looking between the fingers as if searching for pieces which might be retained there.

The following day, July 15, Suzette appeared somewhat depressed and coughed a good deal, but when food was offered she appeared hungry. She drank milk containing raw eggs, and ate some bananas and stewed prunes. The breasts were not enlarged and there were no evidences of the secretion of milk. The baby was kept tucked in Suzette's groin, but while the hands and feet were frequently in motion the general position remained the same. Both Suzette and the baby slept frequently during the day, but whenever she heard Boma calling from the outer cage she always roused up and made an attempt to join him by going to the outer cage door.

On July 16 there was a noticeable enlargement of the mammary glands and Suzette was paying more attention to the baby. She frequently examined the inside of its hands and feet, and would lie on her back and fondle the baby's feet without looking at them. She also would sit upright and make a chuckling sound, accompanied by a vibration of the abdominal muscles, which expresses the emotion of pleasure and is frequently observed in chimpanzees when they are tickled under the arms by their keeper. On this day the baby was carried higher on the abdomen of the mother and clung by holding on with hands and feet tightly grasped to the hair.

On July 17 Suzette was depressed and showed very little interest in her food. She had a distressing cough, fever and headache, the latter manifested by keeping her hands pressed over her forehead. For most of the

day she was restless and drowsy. Her breasts showed some enlargement but there were no evidences of milk-secretion. The baby seemed more active and occasionally would cry, and this acted as a signal for the mother to immediately sit up, shift the baby and hurriedly readjust the straw bedding.

On July 18 Keeper Spicer reported having seen the baby nursing on the left breast at 9 A. M. for about one minute. Suzette appeared much brighter and took considerable food, consisting of cocoa and milk, bananas and prunes. The baby was not so active on this day and appeared to be noticeably thinner. It slept practically all the time. Suzette moved her bedding from the front of the cage to the top of the sleeping-boxes. She lay on her back with the baby in her groin or across her abdomen.

On July 19 Suzette seemed in better spirits and her cough was less troublesome. In addition to her regular food, she ate some mashed potatoes and two lamb chops, with great relish. She kept to her bed and rarely left it, and then only for a moment. In starting from her bed for food she apparently brought pressure to bear on the infant, for it usually emitted plaintive cries, which caused Suzette to immediately hurry back to her bed, hastily rearrange the straw and lie down. In a few minutes she would again start to leave the bed, but the baby's cry again caused her to settle down, shift the baby to the other side and rearrange the straw.

On July 20 Suzette remained in her bed all day and this did not afford such a good opportunity to observe the movements of the baby. It had not been seen to nurse since Sunday morning, July 18, nor had it been seen near the mother's breast.

On July 21 and 22 Suzette still kept to her bed. The baby seemed less active, thinner, and weaker in the movements of its hands and feet. Suzette seemed to have less interest and to pay less attention to it.

On July 22, about 9 A. M., when I appeared in front of Suzette's cage, she at once came from her bed directly toward me and, while watching for the movements of the baby, I saw its body relax and realized it had just died. Suzette almost immediately seemed to realize that something was wrong. She became uneasy and in moving away from the front of the cage, the baby hung limp and lifeless and ready to slip from her groin.

She sat down, gazed intently at its face, gently put her finger-tip in the baby's mouth and turned back the lips. She also put her fingers up in the nostrils. She carried it about as before but would frequently sit down and examine it, looking into its face with an anxious and puzzled expression. Several times Suzette allowed the baby to slip from her groin to the floor of the cage, whereupon she would immediately pick it up again and tuck it into its place. Once or twice she laid it on the straw beside her and studied it intently as if she expected it to move.

It was during one of these quiet intervals that, Suzette's interest being attracted to an offering of food, the keeper succeeded in extracting the dead baby from the cage. When Suzette realized what had happened she became furious, and in her rage rushed about the cage, screaming and pounding the floors and walls. When Boma in the outside cage heard her he also became greatly excited and joined her in her rage and expressions of protest.

The loss of the chimpanzee baby was one of the keen-

est disappointments that we ever have experienced. If it had been possible to assist Suzette in teaching her to nurse the baby properly, it might have thrived. However, it was out of the question for even her most trusted friend and keeper to get near enough to her to attempt assistance. Suzette resented any interference with her baby. If any had been attempted it would have been a dangerous proceeding for the keepers and certainly would have resulted in the killing of the baby. If persisted in, it might have caused the death of Suzette herself. The aroused maniacal rage of an adult chimpanzee is a fearful thing to witness, and the fight she would have put up to keep her baby, certainly would have ended in a tragedy.

CHAPTER V.

GIANTS OF THE ZOO

KEEPER," asked the visitor, "where do you keep the whales?" While the largest mammal on the globe is not represented in the Zoological Park collections, a considerable number of other giant species are to be found here and these never fail to interest both old and young. The giant animals are the African elephant, the Nile hippopotamus, the Indian rhinoceros, the Nubian giraffe, the Asiatic camel, the American bull moose, the American bison, the African eland and the Alaskan brown bear.

Because of their peculiar conformation, their huge size, which exceeds that of all other terrestrial mammals, and the high degree of intelligence which they are known to possess, elephants have always excited an amount of popular interest surpassing that accorded to other animals.

The elephant, possessing a giant's strength, a giant's mildness, a giant's decorum, has also an eye for dignity and moves with as much steadiness and stateliness as if he were constantly engaged in carrying a howdah full of Indian princes. An animal born an elephant must always act the part, for a frolicsome colossus is an outrage to Nature.

The ancient Carthaginians and other nations employed elephants in war, not only as beasts of burden but as combatants. Elephants formed part of the army which Hannibal led across the Alps, and they are said

to have decided the victory at the battle of Trebia in 218 B. C.

At the present day the elephants are represented only by the Indian and African species, but in past epochs there were a number of forms, now extinct, more or less closely related to our modern elephants. The African elephant is readily recognized by its enormous, sail-like ears, which are nearly four times the size of the triangular-shaped ears of the Indian species.

Extravagant estimates of the height of elephants have from time to time been recorded. Their great bulk so far exceeds that of the animals we are accustomed to see that the tendency is to overestimate their size. The late G. P. Sanderson, who was a careful observer, and who had unrivalled opportunities for studying the Indian elephant, never saw one that exceeded nine feet eight inches in height. Among captive Indian elephants, a male standing nine feet, in its bare feet, is considered an extremely big elephant. The Bombay Burma Trading Corporation has records of more than a thousand elephants, and while their largest animal measured nine feet six inches, the average herd elephant does not average more than eight feet.

The big African elephants from the Egyptian Sudan are the largest of all living elephants. Mr. Herbert Lang, formerly of the American Museum of Natural History, has recorded one that measured eleven feet four inches, which constitutes a record from a reliable source. "Jumbo," of the London Zoo and later of Barnum show fame, measured ten feet nine inches. Our Sudan elephant, "Kartoum," now in his twenty-fifth year, measures ten feet seven and one-half inches, and we are hoping that with an extra supply of vitamins he

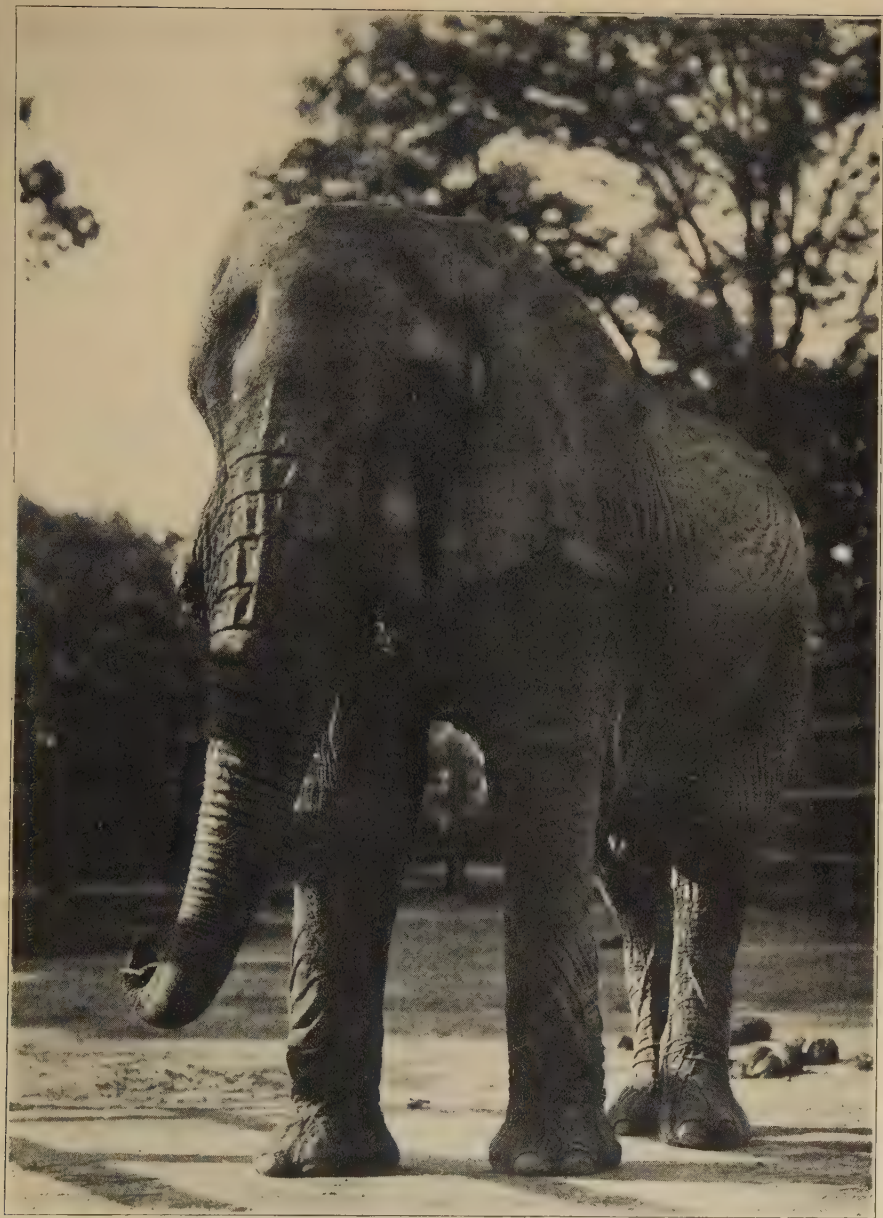
will eventually equal or exceed the height of the famous "Jumbo." "Kartoum's" estimated weight is about four tons. When he arrived at the Zoological Park in 1907, he measured four feet nine and one-half inches and weighed 1,235 pounds.

With growth in height and the acquisition of avoirdupois, "Kartoum" began to test out every particle of steel and concrete in his surroundings, to see what he could dislodge, bend or break. As a contributor to the world's very limited knowledge of the pushing and crushing power of a nearly adult African elephant, "Kartoum" is without a peer; but in spite of his contributions he is not popular with our engineers, iron-workers or masons.

That "Kartoum" has a sentimental side to his nature is illustrated by the fact that he has permitted a pair of robins for two successive summer seasons to build their nests in an angle of a fence-post in his outside yard where he has not allowed a keeper to enter for several years.

All through the period of the incubation of the eggs, lasting two weeks, "Kartoum" made daily inspections, even touching the nest occasionally with the sensitive tip of his trunk, but he never once attempted to disturb it. After the hatching of the tiny robins, "Kartoum" evinced an even greater interest and guardianship. While the parent birds were busily engaged in bringing food to satisfy the fledglings' almost insatiable appetites, "Kartoum" looked on with tolerance and apparent understanding.

The robins that had faith "carried on" and succeeded in rearing their families within an enclosure where keepers feared to tread.



"KARTOUM," LARGEST AFRICAN ELEPHANT IN CAPTIVITY

We are often asked as to the susceptibility of African elephants to training, such as the Indian elephant has undergone in India and elsewhere. It may be of interest to learn that the officers of the Belgian Government, working in the far interior of the Congo Territory for the past twenty years, have demonstrated that the African elephant can be captured and successfully trained to service along lines substantially parallel with those pursued with the Indian species. The number of things that an Indian elephant can be taught to do, and do correctly, is limited only by the mental capacity and industry of his trainer.

Owing to the difficulty in obtaining accurate data as to the age an elephant may attain in a wild state, this subject has doubtless suffered much exaggeration. There appear, however, authentic records of elephants that have been in captivity over a hundred years. I quote Sanderson, who says, "The elephant is full grown, but not fully mature, at about twenty-five years of age, but is not in full vigor or strength until thirty-five." The Burmans, who have considerable experience with elephants, give the period of life as from eighty to one hundred and fifty years. They designate the period of growth as follows:

Up to 25 years as immature.

From 25 to 35 as young.

" 35 to 45 as full-grown.

" 45 to 50 as middle-aged.

" 50 to 60 as on the decline.

At the age of 70 or 80 the animals generally show evidence of having reached the average term of life. All reports of extreme longevity of elephants are either

based on very unsatisfactory evidence or have proved to be merely fiction.

The two striking things about an elephant are the trunk and the tusks. The trunk, next to the human hand, is the most wonderful of all anatomical mechanisms. In addition to its use as a conveyer of food and water to the mouth, the trunk is the organ of touch and smell, and is altogether an extremely delicate and sensitive structure.

The longest elephant tusks of which there is any record came from an elephant that was shot by an American, about twenty-five years ago, a short distance south of the Abyssinian border, and presently landed in the possession of King Menelik. By various channels they finally found their way into the ivory market of London, where they were purchased by Rowland Ward. A short time thereafter they were offered to the New York Zoological Society and were purchased by the late Charles T. Barney, who presented them to the National Collection of Heads and Horns in the Zoological Park. The longest tusk measures eleven feet five and one-half inches, and the pair weigh 292 pounds. Some teeth!

The hippopotamus is a bulky animal, with round, barrel-like body of great length, very short and thick legs and enormous head, in which the muzzle is square. Indeed, the interesting but ugly head of a hippo appears as if it were too large and heavy for its owner, since the animal may frequently be seen resting its ungainly muzzle on the ground as though to relieve the neck from the strain of its weight.

A male hippo measures from 12 to 13 feet in length, is three feet eight inches in height, and weighs approximately 6,000 pounds.

Generally speaking, it may be stated that at the present day the hippopotamus inhabits most of the African rivers and lakes in East, South and West Africa. In Abyssinia these animals are found dwelling in a lake at an elevation of over six thousand feet above sea-level. From the reference to it in the Bible, under the name Behemoth, it is just possible that it may have inhabited Palestine within the historic period.

In the early natural-history descriptions of the hippopotamus facts were heavily coated with fiction. Zenghi, who was the first to describe the hippo in the year 1603, wrote that the animal feeds upon fish, crocodiles and dead human bodies. The friends of our hippo "Pete" will be glad to know that his ancestors were pure vegetarians and that there is no justification for placing credence in the tale of their flesh-eating or carnivorous propensities. There is no doubt that though the hippo does eat vegetable matter, its teeth are often used as offensive and defensive weapons.

The hippopotamus, being an aquatic creature, naturally can dive and stay under water for some time. There has been some exaggeration as to its capacities in this respect. I have timed our hippo "Pete" on a number of occasions, but the longest time he ever stayed under water for me was $5\frac{1}{2}$ minutes.

The hippo produces at times, especially after just leaving the water, a remarkable secretion from the skin, which is of a bright red color. This fluid contains granules of carmine-colored pigment. Its use remains a mystery, but it is believed to have suggested to the Egyptian priests their description of the "bloody sweat."

The hippopotamus is purely herbivorous and consumes an enormous amount of food. Its capacious stomach which, when extended, measures some nine feet in

length, is capable of containing between four and five bushels, which gives some idea of the vast quantity of nutriment the creature requires. In uncultivated districts, grass and various water plants afford the chief food supply; but where the land adjoining the rivers is under cultivation, the damage done by hippopotami to growing crops of rice, millet, corn and sugar is enormous. It is not only the amount they consume in these raids but the quantity damaged in their passage from one point of the field to another that makes the hippo so unpopular with the farmers in certain parts of Africa.

Hippopotami thrive well in captivity and breed not infrequently. Our hippo "Pete" is a native New Yorker, having been born in the Central Park Menagerie twenty-five years ago.

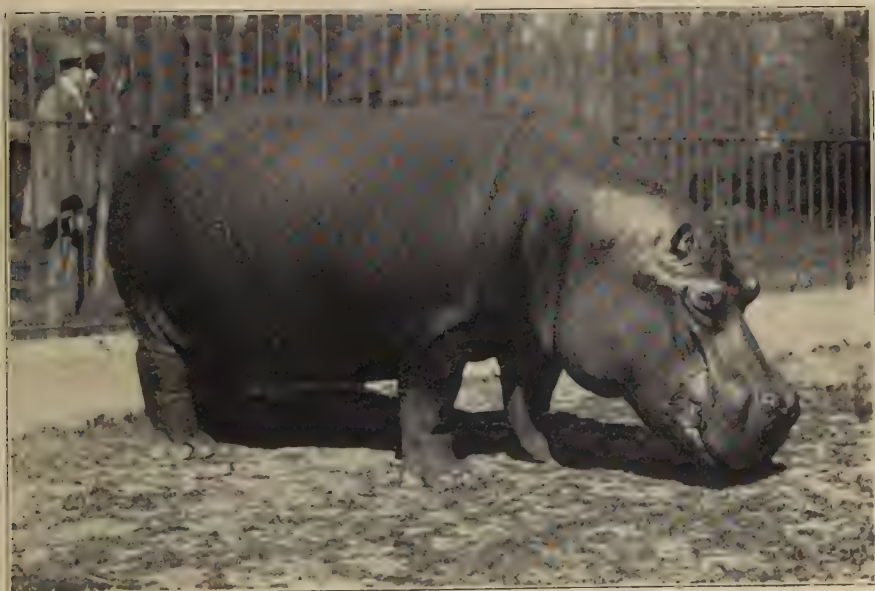
Although inferior to the hippopotamus in length of body and in weight, the larger species of rhinoceros exceeds it in height and therefore may claim the position of being the land mammal next in point of size to the elephant.

A full-grown Indian rhinoceros is one of the most wonderful of all living animals. It seems like a prehistoric monster belonging to the days of the dinosaurs rather than a creature of to-day. It differs from the African rhinoceros by possessing but a single horn. An adult male stands about five feet six inches in shoulder-height, and is ten feet six inches long from the tip of the nose to the root of the tail.

The skin is very thick and lies upon the animal in great rigid slabs of shield-like pieces, which are divided by articulating folds of thinner skin. The skin, more particularly on the sides of the body, is studded with a great number of large convex tubercles, reminding one



"GUNDA" WITH KEEPER GLEASON



HIPPOPOTAMUS "PETER THE GREAT"

of the rivets in an iron boiler or in the iron plates of a battle-ship. The folds of the skin in front and behind the shoulder form one large triangular shield on each side, while smaller folds appear on each hip. There is a huge saddle-shaped body-shield plate extending across the back between the shoulder and hip-plates.

From the immense thickness and apparent toughness of its great folds, it was long considered that the hide of the Indian rhinoceros was bullet-proof, except at the joints of the armor-like shield plates. As a matter of fact, the skin of the animal is quite soft and can readily be penetrated in any place by a bullet or pierced by a hunting-knife. When dried, however, it becomes exceedingly hard and it was formerly employed by the Indian princes in the manufacture of shields for their soldiery.

So pronounced is the rarity of the great Indian rhinoceros that for many years no specimens have come into the wild-animal market. In fact, they have nearly disappeared from India and are now restricted to the Assam plain and Nepal, where the few remaining specimens are protected by the Government. Little is known of the habits of the Indian rhinoceros in the wild state, beyond the fact that it chiefly inhabits the grassy jungles that are on swampy ground, and that it is fond of mud-bathing.

The only specimen in captivity, so far as we know, is the one in the Zoological Park, which was purchased a few years ago at a cost of \$8,000. On arrival it was about three years old, stood forty inches high at the shoulder and weighed 976 pounds. The animal was bought for the Zoological Society by Frank H. Buck, who made a special trip to India to secure it and personally conducted it to New York. The animal made the journey in

a roomy crate constructed of teak-wood, the crate alone weighing nearly a thousand pounds.

The giraffe has an appearance that is so familiar as to need no special description. But just try to describe a giraffe to a person who has never seen one! You will find yourself in sympathy with that incredulous man who visited the Zoo and saw a giraffe for the first time, and after gazing at it for a few minutes in open-eyed wonder, turned away unconvinced, exclaiming, "Pshaw, there ain't no sich animal!"

Some people have discovered ugliness and a want of grace in the giraffe, but I consider that he is one of the most strikingly beautiful creatures of the animal creation. The skin coloration takes the form of large blotches or patches of some shade of chestnut or brown, irregularly distributed over a pale tawny ground color.

Owing to the great length of its neck and legs, coupled with its large bodily size, the giraffe is by far the tallest of all mammals. A full-grown male specimen measures as much as eighteen feet from the soles of the feet to the summit of the head.

The giraffe occupies a good social, but a somewhat peculiar zoological, position in the animal kingdom, standing near the horned cattle and the antlered deer, allied to both and yet distinct from either group.

There are several species of giraffe, but the oldest, the best known and the one most commonly seen in captivity is the three-horned giraffe found in Africa from Central Uganda southward. Except in certain rigidly protected districts, the giraffe is now rare, particularly throughout the regions that are accessible to hunters.

The lengthy neck of the giraffe is interesting as illustrating the permanence of type in animal structure. It



GIRAFFE AND CALF A FEW DAYS OLD

might be supposed that the neck of the giraffe, and that of the hippopotamus, to take two of the greatest contrasts in neck architecture that occur among mammals, were lengthened or shortened by the omission or addition of vertebræ. But nothing of the sort occurs. In both animals, as in nearly all mammals, there are but seven of these neck bones. The giraffe's long neck is produced by the elongation of each individual vertebra, while in the case of the hippo the bones are compressed.

The tongue is also remarkable for its great length and the distance it can be protruded beyond the lips, thus acting as a grasping organ of considerable power.

The food of the giraffe consists almost exclusively of leaves, carefully plucked one by one from the trees by the aid of the long flexible tongue. The senses of both sight and hearing are highly developed, and the lofty position of the head gives to the soft and liquid eyes a wide field of view.

The speed and endurance of giraffes are alike considerable. Their gait is peculiar and takes the form of an awkward gallop, their hind legs being straddled out at each step and coming in front of the fore legs. Lions are their chief enemies.

In captivity they are usually good-tempered and thrive well. A calf which was born to our pair on July 17, 1924, is now about nine feet eight inches in height. A pair of full-grown giraffes is worth from \$15,000 to \$20,000. Their food consists of clover-hay, broken forage biscuits, an assortment of raw vegetables and small quantities of grain and bran.

The camels of the world, of which there are two distinct species, are characterized by their great bodily size and bulk and the presence of one large hump on the

back of the Arabian camel or dromedary, and two humps on the Bactrian camel of Central Asia. The history of the camel goes so far back toward the foundation of man's dynasty that beside it the oldest American history seems but a record of yesterday.

The whole form of these animals is far from beautiful and this want of bodily beauty is accompanied by a viciousness of temper and general stupidity which can scarcely be paralleled elsewhere among animals. The camel in captivity, however, is usually a very mild and tractable animal. While he does sometimes kick and bite, his chief offensive weapon is spitting. And how he can spit! This unpleasant habit is also characteristic of the camel's near relatives, the llamas and alpacas.

In spite of these handicaps it must be remembered that the camel has been for ages one of the greatest aids to mankind, and without this animal many portions of the Old World would be uninhabitable. In addition to its value as a beast of burden, the camel is also esteemed by the natives of many countries on account of its milk and flesh, while its hair is woven into ropes and cloth and in some parts of India its bones are used for inlaying furniture.

With all his patience, in spite of his long domestication and notwithstanding his large, soft, sympathetic-looking eyes, the camel is unattractive and has been looked upon more in the light of a strange natural history curiosity, valuable only to certain tribes in certain countries. He shows no appreciation for affection and resents any attempt to win his confidence by petting or caressing. In fact, you must not take any liberties with a camel.

The Arabian camels, or dromedaries, are found in a

domestic state in nearly all parts of Africa. They are lighter in build than the Bactrian and therefore capable of much greater speed in travelling. The Bactrian camel is the beast of heavy burden, the four-footed freight-car of the desert sands. He can carry four to five hundred pounds of freight long distances between drinks. The ordinary pace of a baggage-camel is from two and a half to three miles an hour when fully loaded, but a good dromedary or riding-camel will pace upward to eight miles an hour for long distances. In certain parts of Central Asia the Bactrian camels are largely used for draft purposes and are harnessed to wagons. Since the working camel cannot wear the ordinary collar-harness because this would cause pressure on the wind-pipe and thus interfere with breathing, the animal requires a special harness. This usually consists of a broad strap surrounding the humps and terminating in a girth or bellyband. Camels are also employed by the Russians to carry heavy loads, as well as being used for farming purposes, especially in ploughing and tilling the soil.

The hump is an extraordinary feature of the camel, which tends to heighten the distorted appearance of the animal. It consists principally of fat and is a provision of Nature for endurance and long abstinence and, speaking literally, the camel feeds on its own hump. When it is obliged to go without food and water and is thrown completely on its own resources, it draws gradually on this natural store of fatty matter and is thus enabled to carry on for several days. When the animal is in good condition, the hump stands upright. The richer the food of the camel, the larger is its hump, whereas when the food is poor and dry the hump decreases in size. Accordingly, in the rainy season the

hump attains its maximum development, while in the dry months it shrinks, and in half-starved animals it nearly disappears.

For a few days, owing to the peculiar conformation of their stomach compartments, camels can exist comfortably without water, but their endurance in this respect is often taxed sadly beyond its natural capacity.

Contrary to the generally popular impression, the camel is not an extremely long-lived animal. It has been found that they rarely live beyond forty to fifty years. They begin work at five years of age and continue in general use up to twenty or twenty-five years of age.

The use of the camel in warfare has proved of great service. Field Marshal Lord Allenby, the conqueror of Jerusalem, is said to have used as many as 60,000 camels in his campaigns against the Turks during the World War. Here it was fully demonstrated that the camel in his own country and climate is vastly superior to the horse or mule as an army transport.

The eland is the largest and most imposing of all the African antelopes and differs from the other members of this group in that both the male and female have horns, these being spirally twisted on their own axes, and directed upward and outward to a length of from 24 to 30 inches. The horns of the female are usually longer but more slender than those of the male. Both sexes also have a large dewlap or loose fold of skin in the lower part of the neck. The head and body color varies from pale fawn to bluish gray. An average-sized bull eland stands five feet nine inches at the shoulder and will weigh from 1,400 to 1,500 pounds.

Elands were once found in great herds throughout nearly the whole of eastern Africa, from the Cape to



AUDAD WITH YOUNG



BABY CAMEL SIX HOURS OLD

the Sahara. They are found in the desert country and in wooded districts, both hilly and flat. Unfortunately, however, white hunters and modern firearms have reduced the countless thousands to a number so small that the capture and exportation of elands have practically ceased. Their complete extermination is merely a matter of time because they are slaughtered for their valuable hides.

Elands are generally accompanied by "rhinoceros birds," friendly hosts which light on their bodies in search of ticks with which the animals are infested. The "rhinoceros birds" in addition to rendering a good service in keeping the animals free from ticks are also useful in giving alarm at the first approach of dangerous enemies, which they do by running about the elands' heads, flapping their wings and screeching at the same time.

The eland does well in captivity. About seventeen years ago the Duke of Bedford presented to the Zoological Park a fine pair of young eland which were bred on his estate at Woburn Abbey, England. They have developed well here and we have raised a number of fine animals from this pair.

Owing to its peculiar feeding habits, the moose is a very difficult animal to keep alive and healthy in captivity. After an interval of nearly twenty-five years, the Zoological Park a few years ago received a young bull moose, not one of the nearly extinct political species but a genuine Canadian moose from northern Quebec. It was captured when but two days old, carried two miles to a lumber camp and brought up on bottled cow's milk. Its former owner had trained it to drive in harness and during the winter it had been driven to a sled. When it

came to the Zoological Park "Teddy" was two years old. Up to that age a bull moose is generally docile, confiding and affectionate.

The adult moose is the largest representative of the deer family, living or extinct. Even the extinct Irish elk, with antlers which spread nine feet three inches, was a smaller animal. It is a satisfaction to know that the largest deer that ever trod the earth is alive to-day and an inhabitant of our continent. Imagine, if you can, an antlered animal standing between six and seven feet high at the shoulder, its legs quite four feet long, its neck and body covered with a heavy thatch of coarse, purplish-gray hair from three to six inches long, and its huge head crowned with massive, shovel-like antlers spreading from five to six feet in width and weighing from fifty to sixty pounds! The weight of the animal is about 1,300 pounds.

The full-grown bull moose has a curious pendulous appendage on the throat, formed by a dilatation or fold of the skin and covered with long coarse hair. This appendage sometimes reaches a length of 14 inches. It is known to American hunters as the "bell" and is occasionally seen in the cow moose.

Naturally, because of its great proportions and its massive antlers, the bull moose, which Nature has been millions of years in bringing to perfection, has been to every hunter of big game a grand prize. The moose is so marvellously gifted with the sense of smell and hearing, and its wariness and speed are so great that a skilful moose-hunter is conceded to have achieved the perfection of woodcraft when he has bagged one. Yet it has been found numberless times that a moose seeing a man, *without smelling* him, is likely to stand and gaze

at him in blank curiosity. This happens often during the summer months when the moose is in the water and the man in a canoe. Such occasions afford great opportunities to the camera hunter. Nearly all good photographs of wild moose have been taken at such times.

The moose is not a grazing animal like the elk and most other members of the deer family. It lives by "browsing" or eating the bark, twigs and leaves of trees such as the birch, hemlock, spruce, willow and maple. It is strictly a forest animal and is never found on open, treeless plains. In North America the range of the moose was at one time very extensive but it is now principally confined to Canada and Alaska.

The American bison, commonly known as the American buffalo, is the largest and finest of our North American animals and must be considered as one of the giants of the Zoo.

This noble species, formerly ranging over one-third of the North American continent, has now practically disappeared as a wild creature, except for the existence of small bands in Canada north of the Peace River. The buffalo was migratory in its habits and in this respect it differed from most of the large terrestrial animals of America. In the spring, on the return of mild weather, the northern herds migrated northward as much as four hundred miles to feed on the better pasturage to be found there, and again at the approach of winter the great herds moved southward.

The vast herds of buffalo, so well known to the early western pioneers, numbered several millions of animals and they roamed the West as late as 1865, where "they seemed to clothe the prairies in a coat of brown." Colonel R. I. Dodge in May, 1871, driving along the Ar-

kansas River for twenty-five miles, saw an unbroken herd of buffaloes on its annual spring migration northward. Doctor Hornaday has estimated that this herd comprised nearly half a million animals.

In 1869 the general buffalo herd was divided, by the completion of the Union Pacific Railway, into a "northern herd" and a "southern herd." In the autumn of 1871 the southern herd was savagely attacked by hide-hunters and within four years the buffaloes had been nearly annihilated. These splendid creatures could not long withstand the ever-increasing demands for buffalo-robbs.

It is only within comparatively recent years that any definite effort has been made to preserve the buffalo from complete extermination. In 1900 it was estimated that there were less than 1,000 buffaloes in North America. Beginning with the year 1902, thanks to the American Bison Society, the New York Zoological Society, the United States Department of Agriculture and the Canadian National Government, great progress has been made in the preservation of the bison for future generations. As a result of the co-operation of these agencies the bison now number nearly 20,000 head. Of these Canada has about 14,000. The splendid efforts of the Candian Government to preserve and propagate the buffalo have met with great success.

In 1907 the New York Zoological Society presented to the United States Government a herd of fifteen bison to serve as a nucleus for an independent National Herd. The United States Government fenced an area of twelve square miles of good grazing ground in the Wichita Forest and Game Preserve in Oklahoma. This effort was completely successful and the herd there now numbers about 200 head.

The great shaggy coat of hair on the neck, hump and shoulders, terminating at the knees in a thick mass of long black hair, gives the buffalo a massive and grand appearance. Probably the largest buffalo ever measured is the one that was shot by Doctor W. T. Hornaday in Montana in 1886 and which is now in the mounted group in the United States National Museum at Washington. This animal measured five feet eight inches in height at the shoulder and weighed 2,100 pounds.

The buffalo breeds readily in captivity and except in rare instances it is not dangerous to care for. The bison calves are usually born in May or June. Like all thick-haired animals in the temperate zone, the American bison sheds its coat in the spring and does not regain its full pelage until November.

The largest and most spectacular carnivorous animals on earth are the great brown bears inhabiting Alaska and the adjacent islands. There are a number of different species but all are huge creatures, characterized by high shoulders, massive heads, shaggy brown pelage and large claws. A full-grown specimen will weigh 1,200 pounds or more. Our largest bear, "Ivan," standing erect on his hind legs measured eight and one-half feet. In their native state they live chiefly upon salmon, which they catch from the small streams.

In some parts of Alaska the big brown bears are very numerous, and dangerous antagonists when molested. In captivity, when kept under proper conditions, they are cheerful, full of playful spirits, and prime favorites with visitors, both young and old. We have several specimens of the large brown bears that have been in captivity for eighteen to twenty-three years and are still going strong.

Bears in nearly all cold climates regularly hibernate during the winter. While they are extremely fat at the commencement of their winter sleep, they are greatly reduced in weight when they emerge during the latter part of March or early in April. The cubs are born, usually two in number, during the latter part of hibernation and accompany the mother when she issues forth. From this time on the cub's life is given over to play and the general enjoyment of life.

In regard to the proverbial "hug," the story is apparently devoid of foundation. A bear, on account of its anatomical structure, strikes round with its paws as if grasping, and the blow of its powerful arm drives its claws into the body of its victim, which action apparently gave rise to its "hugging" reputation.

CHAPTER VI

PYGMIES OF THE ZOO

WHILE we know that once upon a time "there were giants in the earth," we have no record to show that they were tribal, but all dwarf history points to a family form, their weapons, customs and habits being but slightly varied. No nation of giants now exists on the face of the earth. Perhaps King Arthur and his knights slew the last of the British variety, and if any specimens remain they are either attached to a circus or killed by Jack-the-Giant-killer at Christmas time. The giant is either a myth or a monstrosity but the pygmy is a living and interesting fact.

The black human pygmies of Africa are a well-proportioned race, and with the exception of their remarkably short stature may be regarded as normal and well-developed people. They are not degenerate, as has often been stated, although socially they are considered inferior to other tribes.

Fear of their vengeance causes them to be held in awe by other tribes. Their powers of observation are wonderfully keen. Accustomed to depend upon keenness of sight for his daily food and by his hunter's life brought into close contact with the dangers of the bush, it is not surprising that the pygmy should have cultivated quickness of sight and keenness of perception to a degree found among no other race of human beings.

About twenty-two years ago, a genuine African pygmy belonging to the sub-race commonly miscalled "the dwarfs," was employed in the Zoological Park for

a short time. Ota Benga was the name of this pygmy and he was brought to America by Mr. Samuel P. Verner, an American explorer and collector. At that time Ota Benga was about twenty-three years of age, stood 4 feet 11 inches in height and weighed 103 pounds. He was a well-built, sturdy little man, with dark glossy reddish skin. His front teeth were filed to sharp points, —a distinguishing mark of the pygmy tribes. He had been married twice. His first wife was stolen by a tribe of hostile savages and his second wife died from the bite of a poisonous snake.

Ota Benga was found by Mr. Verner on one of the southern tributaries of the Congo, a captive in the hands of a tribe of cannibalistic savages known as the Baschilde. Knowing that this tribe sometimes sacrifice their slaves, and sometimes eat them, Mr. Verner, prompted solely by the instincts of humanity, ransomed Ota Benga and tried to convey him back to his own country. The attempt to return Ota Benga to his home failed because of insurmountable obstacles. The pygmy then begged to accompany Mr. Verner to America, and even threatened to drown himself if not permitted to do so.

Ota Benga belonged to the tribe known as the *Bachichi*, a word which means "bushman." The *Bachichi* are true pygmies but they are not dwarfs. They are the bantams of the African race. They are found in scattered communities in many portions of the great equatorial forest and have been met and described under various names by DuChaillu, Stanley, Schweinfurth, Wellé and other explorers.

Ota Benga brought with him a fine young chimpanzee and they were inseparable companions, the pygmy

spending so much of his time in the chimpanzee's cage that some of our colored citizens got the false impression that we were exhibiting a caged human pygmy. Ota Benga's vocabulary was limited to about 100 English words, his most frequent ones being four,—“Give me soda water.” He was a very skilful trader, haggling over a bargain for a long time, and after completing a trade he would still hold out for something more, without the slightest sense of shame.

While the characteristics of the human pygmy are pretty well known, the fact that there are a number of animal pygmies will come as a surprise to many. The chief homes of the animal pygmies are Africa, India and Malaysia.

Despite all the exploring and hunting of game animals throughout Africa by white men, the Dark Continent has not yet given up all of her wild-animal secrets. The wonderful pygmy African elephant discovered in West Africa in 1905 was brought to the Zoological Park the same year.

The ordinary types of African and Indian elephants are so well known, and so frequently seen in captivity, that they will serve well for comparison with the pygmy elephant. The larger type of African elephant grows to a height of over ten feet and a weight of from four to five tons. The maximum height of a pygmy elephant rarely exceeds six feet. Their tusks measure less than two feet and, as compared with the huge eleven-foot tusks of the largest species of African elephants, they appear like mere toys.

Another point in which the two types differ is in the size and shape of the ears. The ear of the large African elephant covers the whole of the neck and the lower

edge of it extends below the line of the lower jaw. It is triangular in shape while that of the pygmy is small and somewhat circular in outline.

Our first pygmy elephant, "Congo," at the time of his arrival measured three feet eight inches at the shoulder and weighed exactly 600 pounds. His tusks were four inches long. At seventeen years of age, when he reached his full development, he measured six feet eight inches and weighed 2,870 pounds.

Our second pygmy elephant, a diminutive creature named "Tiny," was captured in the summer of 1922 in the Congo country of equatorial West Africa. At that time she measured thirty-six inches at the shoulder and weighed approximately 450 pounds. Three years after her arrival "Tiny" had grown seventeen inches and gained in weight 830 pounds.

In disposition there is a marked difference between the pygmy elephant and his big brother. Whereas the big elephants, both the African and Indian species, are quiet and undemonstrative almost to the point of dullness, the pygmy is active, affectionate and good-natured, except at meal-time. Should there be any delay at feeding-time, which is two o'clock every afternoon, "Tiny" tears about her compartment, or yard, raising Cain generally until her food is forthcoming.

Because of "Tiny's" happy and playful disposition she is a great favorite with the visitors to the Zoo.

Every zoological collection fortunate enough to possess a pygmy hippopotamus considers this species a great prize. When the Zoological Park imported three of these animals in 1912 at a cost of \$15,000, this acquisition was looked upon by zoologists as an outstanding event.



PYGMY HIPPOPOTAMUS AND YOUNG



ECHIDNA (SPINY ANT-EATER)

Up to that time not a single living specimen had ever been exhibited. Since their arrival they have been bred successfully and now our happy hippo family numbers five members, while several have been sold to other institutions.

If any of my readers desire a fine pygmy hippopotamus for a pet, we have one for sale at the low price of \$3,000 f. o. b. New York City. The first order received accompanied by a certified check will bring a fine young hippo free from blemish and in sound health and spirits. A full-grown specimen of the pygmy species weighs about 400 pounds as compared with the 6,000 pound Nile hippopotamus, which it closely resembles in form and beauty. The latter is much too large as a pet for the modern kitchenette apartment.

Some information relative to the capture of these unusual creatures may be of interest.

While the pygmy hippopotamus had been reported by explorers to exist in the remote swamps and wet forests of Liberia, its habits, however, were quite unknown until within recent years. It was through the enterprise of the late Carl Hagenbeck, the famous wild-animal dealer, that an expedition was sent in 1911 to Liberia for the sole purpose of capturing a number of pygmy hippos. Major Hans Schomburg headed this expedition, and after reaching Liberia and organizing a caravan of some fifty native hunters, guides and carriers, he proceeded to the home of the pygmy hippos. After overcoming many obstacles Major Schomburg's party finally succeeded in capturing three of these interesting animals, all of them eventually reaching the Zoological Park safely and in good condition.

This expedition during its time in the field learned

much about the ways and habits of these animals, hitherto unknown. It was found that the pygmy hippo does not frequent the larger rivers and in this respect it differs from its gigantic relative of the Nile region. The pygmy species make their homes principally in the dense forests along the banks of the smaller streams, where they enlarge the hollows made by the water washing away the earth under the banks. It is in these tunnels that the animals seek shelter and sleep during the heat of the day.

Instead of travelling well-beaten paths to their feeding-grounds, it was found that they wandered great distances in the dense forests. Whenever the collecting party discovered a likely place a pit was dug to entrap the hippos. These pits were seven feet deep and carefully covered with leaves and branches in order to prevent the animals from detecting them. In all, more than one hundred pits were dug before any of the animals were captured. After capture, each animal was confined in a native-made basket-crate and the carriers transported them through the rough, roadless forests of Liberia until they reached the river where boat-transport could be obtained. It took the expedition twelve days to complete the journey from the place of capture to the first river where transportation was available for the trip down to the coast.

The anoa, or pygmy buffalo, from Celebes is the dwarfed representative of the Indian buffalo. It is the smallest of the bovines, or oxen, measuring about thirty-six inches at the shoulder. The color is dark brown, and the strong, sharply-pointed horns measure about twelve inches. The pygmy buffalo has a considerable resemblance to a young Indian buffalo and agrees with that group in the barrel-like form of its body. It likewise

resembles that animal in its bovine smell and its fondness for water. It is a hardy, pugnacious and aggressive animal, even in captivity.

We have been very successful in breeding the pygmy buffalo. Our pygmy buffalo family now numbers four individuals. Several born in the Zoological Park have been sold to other zoological institutions. They are constantly on exhibition in the Antelope House.

There are several species of pygmy deer, all of them confined to India and Ceylon. The one exhibited in the Zoological Park has been the smallest of this species. It is ten inches at the shoulder, weighs about five pounds, and is the smallest member of the hoofed animals. These elegant little deer are found in Southern India, at elevations below 2,000 feet. In color, the back and sides are spotted with white on a brown background. The pygmy deer agree with the true ruminants in the absence of any incisor teeth in the upper jaw, but they possess upper tusks or canine teeth, which in the males attain a considerable length and project below the mouth.

They have a peculiar way of walking in a mincing manner on the extreme tips of their hoofs, which gives a stiff and rigid appearance to the legs and has thus given rise to the popular notion that these animals have no joints. They are timid and shy and lie concealed in grass or jungle, and only venture out to feed in the early morning and at dusk in the evening.

In confinement they become quite tame and gentle but are rarely seen in captivity. We have exhibited several fine specimens which, because of their extremely small size, have been kept in the cages of the Monkey House.

There is a pygmy hog of the forests at the foot of the

Himalayas in India, scarcely larger than a hare. It is brownish-black in color, with small naked ears and very short tail. From the little that is known of these pigs in the wild state it appears that they live in herds of from five to twenty, in grassy jungles. We are constantly on the lookout for this species but none have ever reached America alive.

CHAPTER VII

THE KING OF BEASTS

ON account of its generally majestic appearance and the assumed nobility and fierceness of its character, the title of "King of Beasts" was universally bestowed upon the lion. However, the lion has not been without his critics and there is a strong tendency to depose him from the proud position he has so long occupied. The magnificent proportions of the animal, coupled with the splendid flowing mane decorating the head, shoulders and chest of the male, render the lion by far the most striking in appearance of the whole cat tribe and, indeed, of all the carnivores.

In speaking of the lion Doctor Hornaday says, "The lion is an animal of perpetual interest but, like every other noteworthy wild animal, its haunts are constantly being claimed by civilization and its numbers are rapidly decreasing. It is not a difficult matter to exterminate or drive out from a given territory any large and conspicuous quadruped, and at the present rate of settlement and industrial development in Africa it may easily come to pass that long before the end of the present century the king of beasts will be without a home, outside of zoological collections."

In ancient times lions were known in Rumania and Greece, but civilization has long since driven them out of Europe. To-day their range includes the whole continent of Africa, from Cape Colony to Abyssinia, as well as Persia and northwestern India, although in the

more civilized districts they are now greatly reduced in numbers or completely exterminated.

The members of the cat family may be regarded as the ideal representatives of the carnivores because of their being most completely adapted in all parts of their structure to the pursuit and destruction of living prey. Their long, lithe bodies exhibit in its fullest perfection the combination of strength and agility distinctive of carnivores in general, while their strength is so great that the larger species are able to kill and drag away animals of far greater bulk than their own.

As with all animals whose wide range of distribution exposes them to many different climates and various kinds of food, lions vary in color. All shades of color from tawny yellow to dark brown are seen, but as these variations do not involve any structural changes only one species of lion is recognized.

The lion, by reason of his massive head and long hairy mane, coupled with the fear-inspiring roar, conveys the impression that he is a much more bulky animal than the actual weight indicates. A full-grown male should measure from the tip of the nose to the end of the tail about ten feet, and weigh over 400 pounds.

Painters and poets have largely contributed to the respect in which the lion is held as the King of Beasts. In Africa a different view is officially held and there they are legally classed as "vermin." As our pictures and figures of lions are almost invariably taken from captive specimens, an exaggerated idea of the size and beauty of the mane is commonly current. The mane of the male does not make its appearance until the animal is about three years old, and continues to grow until the age of six. Although the length of life of the lion

is not definitely known, it has been ascertained that it will live to twenty-five, and possibly thirty-five, years.

Like most of the larger cats, lions are essentially nocturnal in their habits. During the daytime they are accustomed to lie asleep in thick beds of reeds or, in drier districts, among thickets and bushes. From these haunts the lions issue forth at sundown in search of their food. They appear to prey largely upon young antelopes, zebras, buffaloes and giraffes. Lions stalk their prey in complete silence. In addition to eating the flesh of animals recently killed, lions will feast upon any dead animal left by the hunter which they may happen to come across.

In regard to the ferocity of the lion's disposition, there is much difference of opinion among observers. Most hunters, however, agree that, as a general rule, a lion will not go out of its way to make an unprovoked attack upon human beings and that in fact it will rather shun a conflict when possible. There is nearly always some explanation of its behavior when it acts otherwise. Often the hunter has approached so near before being discovered that the animal is afraid to turn tail and, urged by its fears, makes a charge. Unlike most of his genus, the lion is not a climber and this general inability to ascend trees has saved the lives of many sportsmen and travellers, although not infrequently at the cost of long and thirsty waiting.

Very diverse impressions appear to be produced on different persons by the lion's roar, some listeners appearing to regard it as a rather commonplace and by no means awe-inspiring sound, while others,—and we believe the majority,—speak of it in far different terms. Such differences of impression must, it is obvious, be

largely due to personal disposition. Usually the lion's roar takes the form of loud, deep-toned, solemn grunts, quickly repeated, and increasing in intensity until the third or fourth, after which it gradually subsides in a succession of low, muffled growlings like the sound of distant thunder, and finally dies away into the deepest bass. The intensity and grandeur of the sound are increased when a number of lions are roaring in concert, and when every individual seems to vie with the others in proving the power of his voice. The vibrating and reverberating sound is intensified by the habit the lion has of putting its mouth close to the ground while roaring. Visitors who have happened to be in the Lion House when three lions were roaring simultaneously can testify to the fact that the roar is by no means commonplace, and that it is no exaggeration to say that the building actually trembles with the volume of sound. Other sounds, even more disconcerting, especially when heard at close quarters, are the angry snarls of the lion when disturbed at his meals, and the coughing grunts which accompany a charge. None of these sounds can be classed as strictly musical.

That lions will, on occasion, attack human beings, there is abundant evidence. Colonel J. H. Patterson, an engineer engaged on the construction of the Uganda Railway, tells of his experiences with two man-eating lions, experiences which constitute one of the most remarkable lion stories ever recorded. A lion story is usually a tale of adventure, often very terrible and pathetic, which occupied but a few hours of one night; but the story of the Tsavo man-eaters, as told by Colonel Patterson, is an epic of terrible tragedies, spread out over several months, and only at last brought to an end by the resourcefulness and determination of one man.



"BEDOUIN MAID" WITH CUBS



ROYAL BENGAL TIGER

Colonel Patterson relates how two voracious and insatiable man-eating lions for over nine months waged an intermittent warfare against the railway and all those connected with it, in the vicinity of Tsavo, British East Africa. This culminated in a perfect reign of terror in December, 1898, when the lions actually succeeded in bringing the work on the railway to a complete standstill for about three weeks. At first they were not always successful in their efforts to carry off a victim, but as time went on and they acquired a taste for human flesh, they stopped at nothing in order to obtain their new-found food. At this time the various camps for the native workmen were so scattered that the lions had a range of some eight miles on either side of Tsavo to work upon, and as their tactics seemed to be to break into a different camp each night, it was most difficult to forestall them.

Colonel Patterson relates an amusing incident which tended to relieve the tension from which their nerves were beginning to suffer. On one occasion an enterprising Indian trader was riding along on his donkey late at night, when suddenly a lion sprang out at him, upsetting both man and beast. The donkey was badly wounded and the lion was just about to seize the trader when in some way or other his claws became entangled in a rope by which two empty oil-cans were strung across the donkey's neck. The rattle and clatter made by these as the lion dragged them after him gave him such a fright that he turned tail and bolted off into the jungle, to the intense relief of the terrified trader, who quickly made his way up the nearest tree and remained there, shivering with fear, for the rest of the night.

The desperate efforts of the white engineers to protect the terrorized black laborers from the nightly on-

slaughters of the lions finally resulted in the death of the man-eaters. During the series of battles, covering a period of several months, the two lions killed and carried off a total of twenty-eight men! How many natives were killed and their deaths not reported never will be known.

The fur of most members of the cat tribe is usually short and of even length over the entire body, but the male lion is an exception in this respect owing to the development of the large mass of long hair on the neck and shoulders to form the flowing mane. Another distinctive characteristic of the male lion is the brush of long hair at the tip of the tail. Wild lions rarely grow the large and luxuriant mane seen on animals bred or long in captivity. It is generally believed that lions in captivity are regularly sheared and the mane and tail-brush left on in order to improve the animal's appearance. We are frequently asked if it is not a difficult task to shear a lion. The answer is, "It would be!"

In order to keep their claws in good condition most cats, from the lion and tiger down to the domestic cat, are in the habit of drawing them down the bark of trees, whereby the claws are rendered sharp and clean.

When caught young, lions are easily tamed and the disposition of the animal in captivity is much more gentle than is that of the tiger.

Our famous lion, "Sultan," was an animal of high intelligence and reliable disposition. Once, when by error of a fellow-keeper the wrong chain was pulled and the wrong partition door opened, a keeper bent his head and, broom in hand, walked into what he thought was an empty cage. To his horror he found himself face to face with "Sultan," with only the length of the

broom-handle between them. The startled and helpless keeper stood still and said in a calm voice, "Hello, Sultan." "Sultan" calmly looked at him, wonderingly and inquiringly, but without even a trace of excitement, and no doubt feeling sure that the keeper did not mean to harm him, he seemed to have no thought of attack. The keeper quietly backed through the low doorway and gently but hastily closed the door and took a long breath. Had the keeper lost his nerve and shown it, there might have been a tragedy.

CHAPTER VIII

WILD HORSES, ASSES AND ZEBRAS

AS a domestic animal the horse is to be found almost everywhere that man can live. His range spreads all over the world, from torrid to arctic climates, in all the continents.

The ancestors of the horse can be traced back nearly 3,000,000 years to an animal which so little suggests a horse that, when its remains were first found about sixty years ago, it was named by the great paleontologist, Richard Owen, the *Hyracotherium*, or coney-like beast. Its relation to the horse was not at that time suspected by Professor Owen, and was recognized by scientific men only when several of the intermediate stages between it and its modern descendant had been discovered.

The earliest known ancestors of the horse were small animals, not larger than the domestic cat, with four complete toes on each forefoot and three on each hind foot. There is reason to believe that the still more ancient ancestors of the horse and of all the mammals had five toes on each foot, since in the forefoot of the earliest known stage we find a splint bone, or small slender rudiment, representing the missing first digit or thumb which no longer appears on the surface of the foot, while in the hind foot there is a similar rudiment representing the outer or fifth digit but no trace is left of the innermost or first digit.

Commencing with the earliest known ancestor, the four-toed horse, twelve stages have been recognized,

showing the gradual evolution of the race into its modern form. Some of these have been found in several parts of the world but by far the most complete and best-known series comes from the Bad Lands of the western states, Colorado, Wyoming and New Mexico.

The horse is spoken of as a domestic animal during the famine in Egypt, when it is stated that Joseph exchanged corn for horses, about 1712 B. C. But as a wild animal the horse is at present limited to the Old World, and is found there only in the open, arid or desert plains of Central Asia and Africa. The wild horse of prehistoric Europe, a small race, short-legged and shaggy-haired, was domesticated by man,—a fact that is known from the rude drawings scratched on bone or ivory by men of the Neolithic or Polished Stone Age.

The domestic horse of to-day is descended chiefly from the Asiatic race, although it is probable that in some breeds there is a considerable strain of this shaggy, short-legged European, and it is possible also that African races may have been domesticated and to some extent mixed with the Asiatic species.

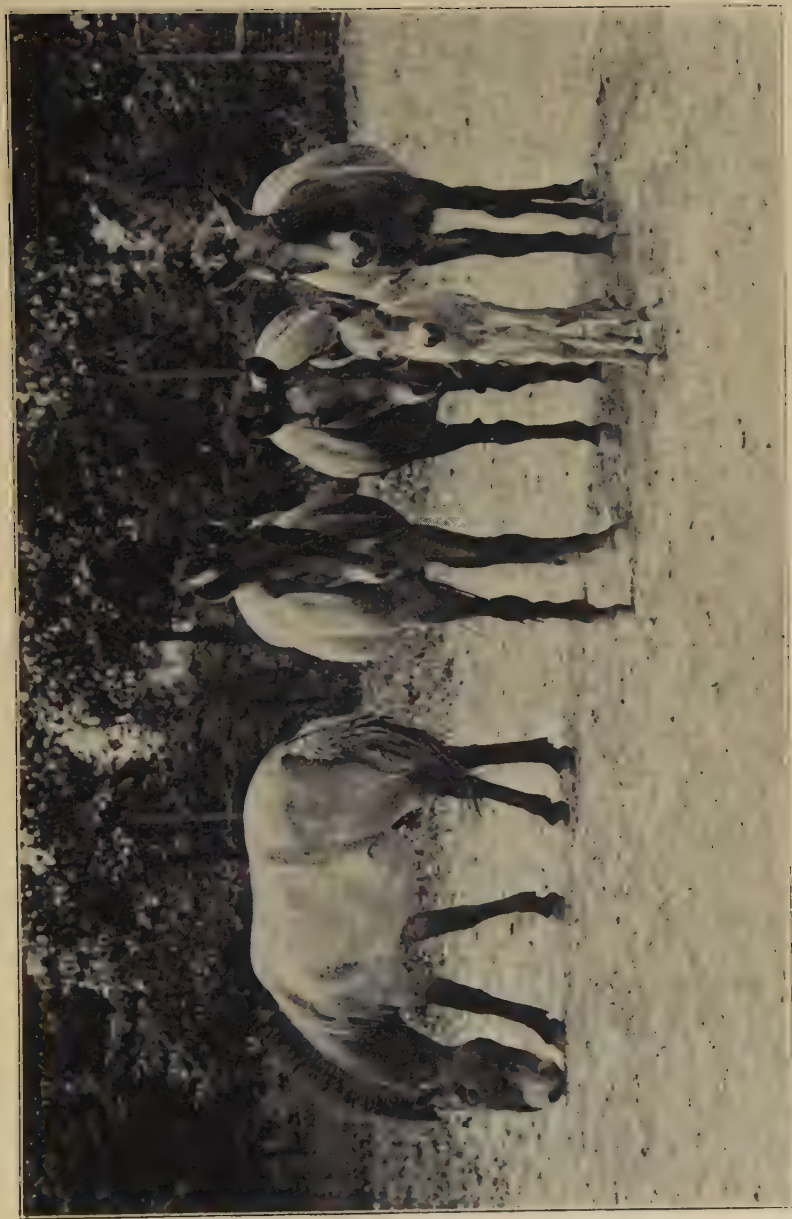
In North and South America and Australia there are no true wild horses, the mustangs and bronchos of the western plains and South America being domesticated animals run wild and descended from the horses brought over from Europe by the early white settlers. When the Spaniards first explored the New World they found no horses on either continent. While the early history of our domestic horse on this continent is of much interest it is not, however, to these that I desire to invite attention.

The wild horses of the world form a zoological group of great interest and well worthy of the big effort that

has been made in the New York Zoological Park to bring together this splendid collection. The Park's exhibit of wild equines is conceded to be the finest and most complete in existence. The list includes the following: Mongolian wild horse, represented by the Prjevalsky horse from the Desert of Gobi, central Asia; the Persian wild ass, from the deserts of south Persia and Arabia; the onager, from western India; the kiang, from north Asia; and the African wild ass, from Abyssinia. Zebras are represented by the Grevy zebra, from Abyssinia and British East Africa; the Grant zebra, from British East Africa; the Chapman zebra, from central and South Africa; the Burchell zebra, from central Africa, and the Mountain zebra, from Cape Colony, South Africa.

About forty years ago a Russian traveller, named Prjevalsky, discovered in one of the deserts of Sungaria, central Asia, between the Altai and Tian-Shan Mountains, a new species of wild horse, which has since been described and named in honor of its discoverer. Amongst wild horses and zebras it is the nearest approach to the domestic horse of civilization, and supplies an important link, hitherto missing, in the chain of evolution which reaches down from the three-toed horse to the domestic animal of to-day.

The remoteness of the region inhabited by this species rendered its capture a matter of great difficulty and expense. About thirty years ago Mr. Hagenbeck received from the Duke of Bedford an order for several specimens, to be purchased, if captured uninjured, at \$5,000 per pair. On the strength of this order Mr. Hagenbeck felt justified in sending out an expedition to capture a number of specimens of the animal desired.



PRJEVALSKY HORSES FROM CENTRAL ASIA

His agents penetrated to the northern border of the Gobi Desert, where they found themselves in the land of the Kirghiz, a tribe noted for its horses and expert horsemanship. Engaging the services of nearly two thousand Kirghiz horsemen and taking with them fifty brood mares in foal, the collectors sought the desert home of the wild horse. After a period of exciting adventure, fifty-two Prjevalsky colts were captured. These were nourished by the domestic mares, which were taken along for this purpose. On the homeward journey it took the caravan three months to reach the Siberian railway, during which time twenty-eight of the colts died, but the other twenty-four reached Hamburg. The expedition was in the field eighteen months and cost \$25,000.

The Prjevalsky wild horse, otherwise known as the Steppe horse, and nearest relative of the domestic horse, is readily distinguished from all modern domesticated breeds by the entire absence of the forelock and by the fact that the mane rises along the neck like a crest exactly as in the zebras and does not fall over on the side as in the domestic horse. About three feet eleven inches in height, it has a rather large head, short and truly horse-like ears, small and inexpressive eyes, and light buff-colored muzzle. The body is of a uniformly light-brownish color, with a dark stripe along the back. Another very distinctive feature is the short stiff hair on the upper portion of the tail, of buff or dun color, traversed by the vertical stripe.

We have bred the Prjevalsky horse on a number of occasions in the Zoological Park and have disposed of our surplus to various zoological institutions.

The Celtic pony of Iceland stands three feet ten

inches in height and is similar to the ponies existing at an early day in northern Ireland. A typical Celtic pony has a small head and slender legs, there is an absence of "chestnuts" on the hind legs, and on the upper part of the tail there are stiff hairs from three to six inches in length. The presence of the unusual bunch of hair at the root of the tail serves a very useful purpose to the animal during snowstorms by forming a shield and preventing the snow from getting to the sensitive skin under the tail and chilling it.

In color the Celtic pony resembles closely the Prjevalsky horse, being of a yellowish dun, with a dark dorsal stripe. The hair is longer during the winter, especially under the jaw, over the hind quarters and upon the legs.

The kiang, from the plains of Tibet and northern Asia, seems next of kin to the wild horse. It stands about four feet two inches at the shoulders and is the largest of the four species of wild asses. The coat is of a dark reddish color, very rough and long in winter, and possesses a dark brown dorsal stripe running from the head to the upper portion of the tail. The abdomen is creamy white. The ears are longer than those of the horse, but not so large as those which characterize the ass family generally. The "chestnuts," which exist on all four legs of the horse, are found only on the front legs of the kiang. The cry of the kiang approaches that of the neighing horse rather than the bray of the donkey and the mule.

In captivity they are active, vicious and dangerous. In western Tibet the kiang lives at elevations of 14,000 feet or over, and, like wild horses, ranges in small

bands. The Tartars capture them for food but they have never been domesticated and remain as wild as when first known by the ancient people of Asia.

The onager is smaller than the kiang. It stands about three feet ten inches high and the hoofs are narrower than those of the kiang. In the summer coat the general color of the upper parts is pale reddish fawn, while the sides and abdomen vary from light brown to silvery white. In winter the coat is long and rough, gray in color, and with sharply defined white areas. Its native home is in western India, at or near sea-level.

The Persian wild ass, from the deserts of south Persia and Arabia, differs very slightly from the onager. Its height is three feet ten inches. It is fawn color, with dark dorsal stripe, light-colored and slender limbs, and dark erect mane. In captivity the Persian wild ass is restless and inclined to be vicious.

The African or Abyssinian wild ass has recently been added to our collection. This species inhabits the desert regions of Abyssinia, Somaliland, the Sudan and the districts in the vicinity of the Red Sea. The general color of the hair is a bluish-gray, with a well-defined dark shoulder-stripe. The ears are much longer than those of its cousins, the Asiatic and Persian wild ass. Owing to its inhabiting inaccessible deserts, and to its being very fleet of foot, the African wild ass is a difficult animal to approach. They are found either in groups of three or four, or in small herds, but they never assemble in large troops. The only specimen in captivity is the one now on exhibition in the Zoological Park. Through the good offices of the British High Commissioner, Lord Allenby, the Zoological Society's repre-

sentative was given a permit for the capture of a single specimen of this rare equine. After much trouble and expense a young specimen was finally captured and safely deposited in the Zoological Park in June, 1925, at a total cost of \$6,000, making this animal one of the costliest specimens to be exhibited here.

The domestic ass is a descendant of the African species.

Grevy's zebra is the largest and in some respects the most horse-like of all the zebras and differs from the others markedly in the width and arrangement of the more numerous stripes, by its long, massive head, and in its very large, broad and hairy ears. The stripes on the legs extend down to the hoofs, but the body-stripes do not completely surround the body, as in some species. Grevy's zebra stands about four feet eight inches in height. It is usually found in small bands of ten or twelve, and seems to prefer the undulating, rocky bush country in northern Somaliland and Abyssinia.

Grevy's zebra is comparatively new to the zoological world, having been discovered and described as late as 1872, when it was named in honor of the President of the French Republic, to whom the type specimen was sent by King Menelik of Abyssinia. That the finest of all the zebra species, the Grevy, should have thus remained wholly unknown until near the end of the nineteenth century seems almost incredible, and this may well indicate that other species even yet may remain to be discovered.

The name "mountain" zebra has been applied to the group inhabiting the mountains of Cape Colony. It is the rarest species in our collection because it is now ex-



CHAPMAN ZEBRA



GREVY ZEBRA



RARE MOUNTAIN ZEBRA



GRANT ZEBRA WITH TWO-DAY-
OLD COLT

inct throughout a large part of its former range and is carefully protected by the South African Government in its remaining mountain home. This zebra is distinguished from other zebras by its smaller size (about three feet ten inches), shorter head, very long ears, and by a distinct dewlap or loose fold in the under skin of the neck. It has very short heavily-built limbs which adapt it to its mountain habitat. Its color-bands are very broad and comparatively few in number, but it possesses a broad gridiron of transverse stripes over the hips. The call of the mountain zebra resembles that of both the horse and the donkey and usually consists of three short, barking whinnies, uttered in quick succession. In disposition it is usually vicious and incapable of domestication.

The Grant zebra is typical of a large group, entirely distinct from the Grevy and mountain zebras. It is the most heavily striped of the group to which it belongs. The horizontal leg-stripes are very pronounced and so numerous that they are carried down to the hoofs. It is further distinguished by its black muzzle, the diamond-shaped pattern of the star on the forehead and the broad gridiron arrangement of stripes over the hips. It stands about three feet eight inches in height and it is intermediate in size between the mountain and Grevy zebras. The Grant zebras are generally docile and capable of domestication. It is one of the most common species seen in captivity. We have had two pairs of Grant zebras and have raised four or five colts.

The Chapman zebra belongs to the Burchell group, to which the Grant zebra also belongs. Its chief distinguishing characteristics are the arrangement of the

body-stripes, the appearance of "shadow stripes" and the absence of any marked stripes on the legs, the fetlocks and pasterns usually being devoid of stripes or spots. A "shadow stripe" is a faint, dark stripe in the middle of a wide white or pale yellow field, which lies between two broad black stripes. The Chapman averages about four feet two inches in height. It is this species which is most commonly seen in captivity and the one which has been broken to harness, but it is not equal to the horse or mule in reliability or stamina. In the Transvaal, teams combining mules and Chapman zebras have been worked more or less successfully in recent years.

The Burchell zebra is the largest of the zebras comprising this group, and a typical specimen stands about four feet in height. It is further distinguished by its short ears and more fully developed mane. The legs are devoid of stripes and the hoofs are more like those of a pony than of any other of the zebras.

Zebras are essentially animals of the plains, on which they congregate in herds, associating frequently with antelopes and ostriches. This association, it has been suggested, may have arisen from the mutual advantage thus obtained, the ostriches by reason of their height being able to see the approach of an enemy in the open, while the others are able to detect the presence of danger through their sense of smell. If one of the troop took flight, the others would be warned to follow suit.

The effect of the striping of the zebra as a protective element has often been discussed. It is commonly believed that the effect, in all the fully-striped groups of zebras, is to render them inconspicuous at a distance

on the plains and at closer range in the moonlight, at dusk and in the jungle. The alternate light and dark stripes harmonize with the shafts and streaks of sunlight falling on foliage, and in fact the stripes on the body and legs break up the general hard outline of the animal into a more or less indistinct soft grayish blur. It is to be noted that in nearly all animals that inhabit open plains the legs and under surfaces of the body are conspicuously lighter than the upper parts, so that when the animal is standing in bright sunshine the light coloring of the lower surface completely counteracts the effect of the dark shade cast by the body and tends to produce invisibility.

The word "camouflage" has become anglicized since the World War. The use of this device on warships and commercial vessels followed the lines of nature in the zebra's skin, and while no painted lines could reduce the outline of a steamship, with its funnels of smoke, to the vanishing point, yet this arrangement did obscure it very much, made aiming at long range more difficult, and gave a feeling of added security to passengers and crew.

The chief enemy of the zebra is the lion, which seems to have a great partiality for zebra flesh. The flesh, although unpalatable to Europeans, is much relished by the natives on account of the yellow fat which it contains.

Zebras were known to the ancients under the name of "hippotigris," and were exhibited from time to time in the Roman Circus.

Zebras have been crossed with domestic mares many times, both in Europe and in this country. The Depart-

ment of Agriculture has conducted some breeding experiments and has succeeded in crossing the Grevy zebra with the domestic mare. The foals which I have seen have usually been seal-brown in color, with indistinct markings, the stripes showing principally around the front and hind legs. The ears are zebra-like. These animals are called zebroids.

CHAPTER IX

CELEBRITIES AMONG THE BIRDS

THE Ostrich of Africa, the Rhea of South America, the Emu of Australia and the Cassowary of the Malay Archipelago and New Guinea are the "running birds" of the Zoo and the giants of the avian world.

The North African Ostrich is the largest of the species. A full-grown male measures eight feet in height and often weighs as much as 300 pounds. It is chiefly distinguished from the other ostriches by its bright red neck and legs.

The eggs of the ostrich are round and white and about twenty times the size of a hen's egg.

The body feathers of the male bird are jet black but the female is of a sombre gray color. It is the white wing-feathers of the male bird that yield the choicest plumes.

In Cape Colony, southern California, Arizona and Florida, large ostrich farms have been established and the annual product of ostrich plumes commanded so high a price that this proved a profitable industry. However, in recent years, owing to the changing styles in Milady's head-dress, many of the ostrich farms have been abandoned. But there are significant signs of Dame Fashion flirting with the ostrich plume again and the industry of former days may be revived in the near future.

About this gigantic bird there have arisen many myths and fables. The time-worn legend that the ostrich buries his head in the desert sand and thereby feels him-

self safe from approaching danger is a grave reflection on the intelligence of this giant bird. If this were true, the capture of wild ostriches for exhibition purposes would be a far more simple undertaking, and we should not be obliged to spend \$1,000 a pair for them.

What an ostrich really does when it becomes aware of danger and thinks itself as yet unperceived is not unlike the action of a wild quail under similar circumstances. It squats down close upon the sand. The long neck that would otherwise make the bird conspicuous is stretched out flat along the ground. It does not bury its head, the eyes are open and alert to see whether it had better be running instead of trying to hide. In this position the ostrich looks like just another hummock on the surface of the desert. Whether the old story had its origin in the faulty observation of some explorer who thought the crouching ostrich had covered its head we may never know. We do know that it is a fable with which we must part rather regretfully, since it affords so apt a comparison with the actions of some of our fellow humans.

The Rhea, sometimes called the South American ostrich, is far inferior in size to the African ostrich, but its habits are very similar and as thoroughly adapted to a life on the South American prairie-like pampas as those of the ostriches are for existence on the African veldt. The rhea is the most graceful of all the "running birds." Its chief enemies are the jaguar and the puma. From these it is protected by its tall stature, dull plumage, and its keen eyesight, which gives it a very wide outlook.

The Cassowaries are forest-haunting birds and in this respect differ essentially from the ostriches and rheas.



RHEA FROM SOUTH AMERICA



NORTH AFRICAN OSTRICH

They are exceedingly swift and possessed of great strength in their legs. In captivity they become extremely tame and not infrequently perform their war-dance around any object that attracts their attention. Although cassowaries will lay freely in the zoo, it is seldom that the eggs are hatched.

Because of the brilliant hues of blue, green, red, and yellow on the naked skin of the head and neck, coupled with the glossy sheen of the blue-black plumage and helmeted heads, cassowaries are the handsomest of all the "running birds." In this family the female does nothing toward reproduction but lay the eggs. The male hatches them, provides the food and takes complete charge of the offspring.

The Emu is somewhat larger than the cassowary and is further distinguished by the absence of a helmet. The plumage is generally light brown mottled with gray. Possessed of great keenness of vision and swiftness of foot, emus rival the kangaroos in speed on the grassy plains of Australia.

Keeper Snyder of the Bird Department has been most successful in the breeding and raising of emu chicks. The eggs are delicately tinted green and artistically etched with a darker shade. The male bird of this species also takes upon himself the duties of incubation and rears the chicks. The young are not of a dull-brown color like their parents but are striped with longitudinal bands of black on a grayish background, which makes them very conspicuous and of a pleasing appearance.

We may justly continue to say "as vain as a peacock" with a perfect basis of fact. We have a dozen or more peafowl running at large about the Zoological

Park and my observation of them leaves me in no doubt about the vanity of the male of that particular species. On a Saturday, Sunday or holiday, when the Park is crowded with visitors, a peacock that finds himself the centre of an admiring group will continue to circle and strut, with every evidence of pleasure and pride, for as many hours as he can attract an audience. Ordinarily, the peacock's gorgeous display is obviously for the pleasure of the peahen only, but when a crowd of people is watching he will "strut his stuff" with no hen anywhere in sight.

A strange eccentric among our peacocks is one old bird who seems to have decided to devote his career to bringing some color and pleasure into the quiet lives of the tortoises. As soon as the tortoises are turned into their yard in the morning, the peacock is on hand. He spreads his tail and struts about among them nearly all day. In fact, he spends practically all his time in the tortoise yard. This performance he has continued for several years. The explanation? We have none.

One of the rarest and most costly birds on exhibition in the Zoological Park is the Shoebill or Whale-headed "Stork"—*Balaeniceps rex*. This bird is, to any collection, a great prize. The common names by which the bird is known are due to the curiously shaped huge bill, which resembles a shoe, while *Balaeniceps* means whale-headed. While it is not a true stork, it is closely related to that species and to the great heron. The shoebill stands fully four feet in height and its plumage is lead-gray in color.

Carefully protected by the Egyptian Government, permission to export shoebills is difficult to obtain. Application was made by the New York Zoological So-



"JIMMY," THE SHOEBILL

ciety, through diplomatic channels, and finally a permit was granted for the capture of one bird. Our specimen was taken from the nest, reared by a resident missionary, and cared for by him for more than a year and a half before an opportunity occurred for its shipment to the Zoological Park.

The shoebills are found only in the Sudan along the White Nile and its tributaries and are exceptionally rare even in their native habitat. They live on fish exclusively and have a unique manner of catching their prey. Two or three birds will wade into the stream and drive the fish into shallow water where they can easily pick them up.

In addition to its huge beak, the shoebill has a curious formation of curly feathers on its head and large prominent eyes which give the impression of a perpetual scowl. The bird is not vicious and is easily tamed.

Aside from our specimen, "Jimmy," the first one ever imported to America, the only other shoebills in captivity are two now in the Giza Zoological Garden at Cairo. Here they are kept in the open all the time, and being practically in their native environment, they thrive.

Two magnificent specimens of the rare and striking Manchurian Crane were recently received at the New York Zoological Park. This is the bird commonly seen in Japanese art, its graceful lines and striking coloration lending themselves well to use in composition. When standing fully erect, its height is five feet or more. The body is pure white, with a black band extending down each side of the neck. The secondary feathers of the wings are also black and fall in a drooping curve over the tail.

The Manchurian Crane is found in northeastern Asia and Japan. Once fairly abundant, it is now extremely rare and no specimens have been imported into America for a considerable number of years. For ages this bird was considered sacred in Japan and severe penalties were exacted if one happened to be injured or killed. While this feeling of veneration for "the lily of birds" has somewhat abated of late, the crane is still held in high regard.

It forms a striking feature of the numerous zoological gardens of Japan and a semi-domesticated strain has been developed which breeds freely under zoo conditions. The birds produced in this manner, however, are so highly prized that they are obtainable only at exorbitant prices, which practically prevents their profitable exportation.

Of the birds of prey one of the most interesting, to Americans at least, is the Bald Eagle. This bird, emblem of our nation, pushed westward by the march of civilization, finally took refuge in Alaska, where it is now threatened with extermination as a result of the placing of a bounty of fifty cents on its head.

The American Bald Eagle, symbolizing nationality, individuality, independence and courage, has been accused of injuring the salmon and fur industries because it took salmon from the rivers and has been known on rare occasions to carry off a young fox. As a matter of fact, the salmon eaten by eagles are usually dead fish found along the banks of streams and it is well known that salmon die after spawning.

After investigation of the alleged depredations of the bald eagle, the Biological Survey of the United States Department of Agriculture declares: "All things con-



MALE EMU WITH CHICKS



MANCHURIAN CRANES

sidered, the American Bald Eagle is rather more beneficial than otherwise, since much of its food is of little or no direct economic value, while the good it does more than compensates for its obnoxious deeds."

This noble bird is not really bald, the name having reference to the white feathers of the head, which give the appearance of baldness. In the immature bird the plumage is entirely brownish black and it does not acquire the white head and tail until it is three years old.

Although its food consists largely of fish, when food is scarce the bald eagle sometimes resorts to strategy and is not above robbing the more skilful fishing osprey of its prey, lunging at this bird with such a show of fierceness that the osprey drops its catch in its eagerness to escape.

Probably the most powerful and the handsomest of the birds of prey is the great Harpy Eagle of Mexico and South America. The Harpy wears a crown of long, heavy plumes which it is able to erect and depress at will. The body plumage is a mixture of white, brown and black. Known to the early Spaniards as the King Eagle, the Harpy attacks and kills animals of more than three times its own size and weight. Turkeys, fawns, foxes, sloths and monkeys alike fall victims to this powerful bird's claws.

The Penguins are perhaps the most amusing birds of the Zoo. The slow, waddling, upright, comically human gait never fails to interest and delight the observer. They appear for all the world like wise little old men and women.

What the seals are to mammals, penguins are to the bird world. Having given up flight and taken to the sea, their feathers have lost all softness and have be-

come small, horny and in general scale-like, while their wings have assumed the shape, movement and appearance of shark's fins, and by means of these strangely altered appendages the penguins are capable of passing swiftly through the water and capturing the fish on which they feed. When swimming they are very seal-like, the webbed feet being laid flat together and used as a rudder to make quick turns, while the wings are used altogether to keep up the wonderful speed of which they are capable.

All penguins are found far south of the equator and the greater majority inhabit the frigid Antarctic regions. While they have the power of swimming, they have never been found far away from their natural rookeries. The question which seems to baffle all naturalists is how the penguins manage to exist during the long winter months in the Antarctic. Little is known about the bird-life in those regions, but perhaps Commander Byrd will be able to bring out some definite information about them.

There are twenty species of penguins, but the ones most commonly seen in zoological gardens are the sombre-colored black-and-white ones, like the Humboldt, the Black-footed, the Rockhopper and the Jackass. The Emperor is the largest species but this has rarely if ever been exhibited in any zoological collection.

Next to the Emperor in size is the King penguin, which stands about three feet in height. The head, neck and throat of the King penguin is brownish-black. The region behind each ear has a pear-shaped patch of yellow, continued as a streak down the sides of the neck and meeting on the upper breast, where it again spreads out. The rest of the breast is shiny white and the back



HARPY EAGLE



KING PENGUINS

and wings are gray. Several years ago we had five of these remarkable birds here.

Both the male and female take their share in the incubating process. Instead of building a nest the egg is placed on top of the webbed foot and covered with a fold of skin and feathers. The penguin has no difficulty in walking about with the egg in this position. However, when she desires to take more active exercise or go into the water, she transfers the egg to the male by simply rolling it off her foot onto his, taking care that the egg does not touch the ground.

A black-footed penguin was once hatched and raised in the Zoological Park and we had an opportunity to observe the method of incubating the eggs and the development of the chick. One morning the keeper discovered the penguin guarding an egg on the floor of the shelter. Two days later a second egg was found. The birds immediately started the process of incubation, relieving each other at intervals. Occasionally the female bird while on the nest was fed by her mate, who brought her fish which he regurgitated and fed to her in the same manner that young nestlings are fed.

Thirty-eight days after the first egg was laid a tiny chick appeared, sparsely covered with soft grayish down. Two days later a second one was hatched but it was never strong and soon died. In the early stages the baby penguin strongly resembled a young gull except that it lacked the characteristic vigor of the latter. Except for the shrill, whining notes to which it gave utterance, it displayed little activity. In four weeks the down on the baby had been replaced by a thick velvety second coat. It was now enormously fat owing to the abundance of food regurgitated by the parents with which it was

gorged. In six weeks the young bird could stand erect, but still depended upon the parents for its food. At eight weeks the second coat was replaced by feathers. By the ninth week the youngster was observed in the water with its parents, diving and swimming like the older birds.

The Cormorants, diving in the glass-fronted tank in the Aquatic Bird House, are sure to have an appreciative audience at feeding time. These birds are distinguished by having the whole four toes connected together by a web. In the same Order are the pelicans, frigate and tropic birds. They have short legs, elongated body and long wings. They are carnivorous, living almost entirely on fish. Some of the birds fish by diving into the water from a height, others capture their prey by pursuit beneath the water. Cormorants are expert divers and swim and dive with great speed and power. Their movements under water are quite as apt as those upon the surface and as a consequence the bird has no difficulty in catching its finny prey, which it transfixes with its sharply pointed beak.

Cormorants, although far more numerous in the warmer regions of the globe than in northern climates, have a wide distribution, inhabiting countries as remote from one another as Great Britain and New Zealand. They seldom leave the neighborhood of the sea, where they are found inhabiting rocky shores and islands. They are social birds and frequently are found in vast flocks, especially on the rocks of South Africa near Cape Town.

In China and Japan, cormorants have been trained to fish for their masters from time immemorial and early in the seventeenth century this practice was introduced

into Europe as a sport. In the East, cormorants are taught to fish from a raft. Young birds are trained to wear a collar to which a cord is attached, to prevent them from swallowing their catch. Instead of casting a line from a fishing-rod into the water of the Yangtse-kiang River many a Chinese coolie has a half a dozen or a fleet of cormorants to do his fishing for him.

Among the many celebrities in the bird collection, the Birds of Paradise are conspicuous. Adult males in full plumage are the most wonderful of our birds, chiefly because of their ability to display their ornaments to the best advantage during the courtship season. In those species in which the male is the more brilliant, the female is invariably dull and uninteresting in color, some shade of neutral brown predominating.

About eighty kinds of birds of paradise are known to science but doubtless many more remain to be discovered in the unexplored mountainous interior of the Island of New Guinea, the principal home of these remarkable birds. The birds of paradise of New Guinea are rigidly protected by the Australian Government throughout that portion of the country which is under its control, and it is only by special permit that it is possible to obtain them.

In 1928 the New York Zoological Society sent an expedition to New Guinea for the purpose of securing a collection of the Birds of Paradise for the Zoological Park. The expedition, under the leadership of Curator of Birds Lee S. Crandall and J. E. Ward, an Australian naturalist, met with extraordinary success. Mr. Crandall returned to New York in March, 1929, with forty-two specimens representing eleven species. No other expedition ever brought out from New Guinea

during a single trip so many valuable live birds or accomplished its object with so few losses. The expedition was in the field for seven months at a cost of about \$12,000.

Many of the species obtained and now on exhibition in the Park have never before been seen in America. Of these the Prince Rudolph Bird of Paradise is perhaps the rarest and most spectacular of all. Our first pair of Prince Rudolph were obtained in 1920 from Ellis S. Joseph, the well-known wild animal dealer, from whom we purchased them for \$1,300.

The antics of the Blue Bird of Paradise during courtship-display are a beautiful sight. He grasps his perch firmly with his powerful feet and hangs head downward. His plumes are then spread to form an inverted triangle of gorgeous, ever-changing blue, bordered at each side with mauve and divided from the glossy black breast by a band of dull red. During the display the body is moved in rapid vibrations, causing the brilliant blues of his plumage to run in waves of color over the entire filmy triangle, which is spread to its widest expanse.

Some months after our first male Blue Bird of Paradise was placed on exhibition a keeper who was working near by noticed that it was hanging upside down from its perch and otherwise conducting itself strangely. The startled keeper promptly reported that the bird was in convulsions and was prepared to remove it to the hospital for treatment. But more deliberate observation showed that while the bird's antics resembled a convulsive attack it evidently was not of the sort that called for medical treatment. It was in full display, such as perhaps had never before been seen by civilized men.

During the seven years that this bird was on exhibition this remarkable display was enjoyed by many thousands of visitors.

Another striking species is the Greater Bird of Paradise, and because of its rarity it has always been sought by zoological gardens and private collectors. The male is about eighteen inches long, the body color is chocolate with emerald throat. From the sides of the body, beneath the wings, spring two great tufts of filmy plumes of bright yellow, shading to brown toward the tips.

In display the male dances to and fro on its perch, the wonderful plumes arched above the back in two twin cascades of shining gold.

The collection of birds of paradise also includes the King, the Magnificent, the Red, the Twelve-wired, the Six-plumed and the Lesser.

Closely related to the birds of paradise are the interesting Bower-birds, whose popular name owes its origin to their extraordinary habit of constructing bowers which are used as a play or courting-house for the attraction of the female. These bowers are built of sticks and twigs and the avenue of approach is adorned with bright-colored berries, flowers, shells and feathers or other objects calculated to influence the æsthetic taste of the female. The bower is usually placed at the back of a large tree. In some of the bowers which have been in use for many years, great collections of bones, colored stones and shells have been found.

In the large flight-cage in the centre of the Large Bird House there is a bower, and visitors may see the Bower-bird repairing and playing about it nearly every day.

The Satin Bower-bird is a powerfully built bird some-

what larger than the starling. The adult male is of a deep shining blue-black, closely resembling satin.

The Hummingbirds are the smallest birds in the Zoo but in many respects they attract more attention than some of the more spectacular exhibits. The glass-fronted cages in which they are exhibited give the visitor an opportunity to observe the birds' feeding habits. While pausing in the air the bird throws its body into rapid and odd contortions while probing, one after another, the blossoms of the petunia, wistaria and other flowers with which the cages are supplied. These birds are also given strained honey, sugar and water, and tiny insects which the bird takes with its peculiar flexible, needle-like, extensile tongue.

The extremely speedy motions of the hummingbird's wings, the beats of which are almost invisible because of their rapid vibrations, are a delight to witness at close range.

Although adorned with brilliant metallic colors, they do not display their tinselled plumage to greatest advantage during flight. It is only when they are at rest on the perch or preening their feathers that these tiny creatures show their iridescent emerald, red and sapphire beauty.

There are nearly five hundred species of hummingbirds known to science and among these every possible variation of form and color is to be found. Some of the smaller species are only two and one-half inches in length. South America and the West Indies are the principal homes of the hummingbirds, but in warm weather they migrate as far north as Alaska.

The Ruby-throated Hummingbird, known to most of us only by a fleeting glance at whirring wings and moth-like body, is the one commonly seen in this vicinity and

the one that nests and breeds here. Several other species are found in the Rocky Mountain States.

Very few hummingbirds have ever lived in captivity more than a few months. What appears to be a record is the pair now living in the Large Bird House in the Zoological Park, where they have been on exhibition for more than two and a half years.

In most species the female is as brilliantly colored as the male, a condition unusual among birds.

A talking bird produces its sounds largely with the larynx. Perhaps the loudest-voiced of the eight-hundred species of birds in the Zoo collection is the Brazilian "Bellbird," whose penetrating calls can be heard half a mile away. This bird makes two sounds, each distinctly different. One is bell-like, the other a clang like the ringing sound of a hammer on an anvil. So far as we can observe, he keeps his mouth and tongue in exactly the same position for each sound, producing his effects entirely by the larynx. For years the Bellbird was a puzzle to Amazonian explorers, who were a long time connecting the prodigious call with this rather small, unimposing white bird, not much larger than our American robin.

The ability to imitate the human voice is not confined to the parrots. I have often wondered how many boys have searched the woods in springtime for a young crow, in the hope of having an amusing talking pet after the crow had been captured and its tongue split. How the idea got started that a crow with a split tongue would become a superior conversationalist I have no information. A crow will learn to talk if he is an intelligent bird but his tongue, whole or divided, has little to do with his speech.

Mr. Ellis S. Joseph once told me of a talking crow

that he owned for many years. This bird's two longest speeches were, "Joe, hitch up the horse!" and the impolite assertion, "Uncle Ned, you're a liar."

Parrots have a great reputation for exceptional longevity, which the facts justify to a degree. We have fairly authentic information of parrots having lived for one hundred years. Four years ago a gray parrot was presented to the Zoo that had been in the home of the donors, a New Jersey family, for forty years. This parrot is an exceptionally intelligent and refined bird, showing evidence of his careful home training. He answers to the name "Harry." He likes to have people around and when in a talkative mood will keep an audience entertained for a long time. He can laugh, whistle all sorts of tunes, and sometimes will say unusual things. He has never used profane language and has been known to say "Thank the Lord" when pleased with any favor. His cage is near the keepers' room and when he wishes to attract the attention of the keeper he summons him by tapping on the wall of his cage.

A definite record exists of a gray parrot living ninety-three years and another of a sulphur-crested cockatoo that survived for eighty-one years.

A red-crested cuckatoo, purchased from the London Zoo, arrived here on September 12, 1906. It was a remarkably tame bird and was kept on a stand on the floor of the Parrot Hall. It was full-winged and was not restrained in any way, but seldom left the stand. The bird was a great attraction, as he could be handled freely by visitors, talked well for a cockatoo and constantly performed amusing antics, such as hanging upside down from his perch, spreading his wings and erecting his scarlet crest, doing a stiff-legged dance, and

occasionally calling "All out" before the building's closing-hour.

His popularity finally proved his undoing, for on a rainy pay-day, when there were no visitors in the building as far as known and the keepers were at lunch in their room, the bird disappeared. This occurred in March, 1910, and while we have always supposed that this cockatoo was stolen, nothing has ever come to light concerning it.

The parrot has, of course, the great reputation among birds as an imitator of human speech, although other species are equally skilful, if not more so. One of the ablest of all is a relative of the blackbird, the hill myna from Java, of which the Zoological Park has a number of specimens and, among these, one splendid talker, who greatly amuses and often mystifies our visitors with its human remarks.

The popular idea that parrots are capable of carrying on intelligent conversation and making appropriate remarks to fit all occasions is, to say the least, somewhat exaggerated. They are very keen at connecting sounds and phrases and frequently say things that are not only amusing but often actually uncanny.

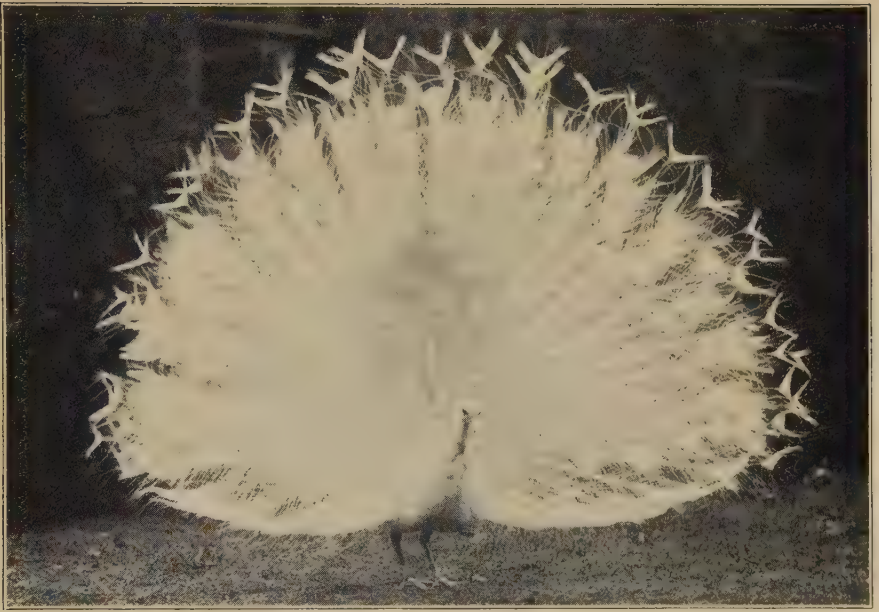
I recall a startling experience with a green parrot brought from the Philippines by General Young and presented to an acquaintance of mine. Soon after the parrot was received in this country it became ill and I was asked to examine it. The owner warned me that the bird was vicious and not trustworthy. Nevertheless, I opened the cage-door and offered my finger as a perch and the bird, apparently friendly, climbed on. Looking pertly out of his small black eyes, the parrot said in an unpleasant, shrill voice, "I'll pick your eye out! I'll pick

your eye out! I'll pick your eye out!" He made no effort to carry out this threat but I was willing to accept as true the character already given him by his owner. While the parrot was an accomplished "cusser," the owner assured me that he had never heard him threaten any one in the language he had used on this occasion.

There are over two thousand specimens of birds in the Zoological Park and they represent approximately eight hundred species. When these figures are considered, some conception will be had of the truly wonderful collection and of the work involved in providing food suitable to each particular species. It requires fifty different items of food to supply the daily needs of the birds alone.

In addition to miscellaneous items like meat, fish, bread, plain cake, eggs, honey, peanuts, brazil nuts, pot-cheese, prepared foods such as Mellen's infant-food, condensed milk, cod-liver oil, pea-meal, zwieback, and game food, the daily menu also includes various kinds of grains, seeds, fruits, vegetables and animal foods. The following list will be of interest in this connection, as giving some idea of the variety necessary to maintain such a collection.

<i>Grains</i>	<i>Seeds</i>	<i>Fruits</i>
Corn.	Canary.	Bananas.
Wheat.	Sunflower.	Apples.
Kaffir Corn.	Millet.	Grapes.
Oats.	Hemp.	Oranges.
Rice.	Wild Grass.	Cherries.
Alfalfa.	Thistle.	Raisins.
	Poppy.	Berries in season.
	Rape.	



WHITE PEACOCK



INTERIOR OF THE FLYING CAGE

<i>Vegetables</i>	<i>Animal Food</i>
Lettuce.	Dried Shrimp.
Cabbage.	Dried Ant Eggs.
Carrots.	Dried Flies.
Green Corn.	Mealworms
Green Peas.	Cockroaches.
	Rats.
	Mice.

One of the best places to see the birds at the feeding hour is at the Flying Cage as this is the summer home of a large number of species placed together. From almost any point of view the Flying Cage with its remarkable collection of showy water birds is a pleasing sight and popular with school-teachers because it affords their pupils a fine opportunity to study, at close range, the movements and attitudes of the birds. Because of the huge size of the cage, which is 155 feet long, 75 feet wide and 55 feet high, the birds fly about the enclosure and furnish continuous moving-pictures and instruction.

Here may be seen the colorful Flamingoes, Ibises, Herons, Egrets, Pelicans, Gulls, Terns, and others equally interesting. The colored-picture labels on the cage aid the visitors in identifying the birds.

The Zoological Park has no funds for advertising its attractions. It depends upon absolute news values for publicity. The Whale-headed Stork from the Egyptian Sudan, the King Penguins from the Antarctic, the Duck-billed Platypus from Australia and the bearded Aoudad from the Barbary Coast each have their day in the newspapers; afterwards they must rely upon mouth to mouth advertising. Personality is as important in the Zoo as on the stage.

CHAPTER X

WHAT'S WHAT IN THE REPTILE HOUSE

THE Reptile House in the Zoological Park contains what is probably the finest and most complete collection of reptiles to be found anywhere. It is very popular with our millions of visitors, and it deserves to be, since it affords a fine opportunity to study groups of animals which are often imperfectly understood and therefore imperfectly appreciated.

Perhaps one reason for the fact that Herpetologists—to give the men who specialize in the study of reptiles their scientific title—have never been numerous is the age-long popular prejudice against creatures, some of which are clammy and some of which are cold to the touch, and some of which may be poisonous. In reality these cold-blooded animals are of fascinating interest, provided they are studied properly along the line of their life histories, their forms, feeding-habits and geographical distribution.

The proverbial aversion to reptiles still remains strong and wholly unreasonable, although we have noted a decided awakening of interest, during the past few years, in snakes. We have school classes coming to the Park, in which young people from ten to fourteen handle a six-foot King snake and minutely examine the creature's glittering scales, the symmetrical arrangement of the head-plates, the playing of the forked tongue and other serpentine characteristics without a

sense of fear. A little reasoning only is necessary to explain away the time-worn fallacies about reptiles being slimy and clammy to the touch, that the tongue is a "sting," and that the snake is naturally antagonistic to man.

The Class *Reptilia* includes four Orders as follows: the *Chelonia*, the *Crocodilia*, the *Lacertilia* and the *Ophidia*.

The *Chelonia* comprise the Turtles and Tortoises, the former being semi-aquatic and marine and the latter terrestrial. They are generally distributed throughout the temperate and tropical parts of the world.

The *Crocodilia* comprise the Crocodiles and Alligators. They are found in tropical and semi-tropical regions. All are semi-aquatic. Among living reptiles they attain the greatest size and bulk.

The *Lacertilia* include the Lizards, which, like the *Crocodilia*, are distributed principally throughout the tropical and semi-tropical parts of the world, although a few species are found in temperate regions.

The order *Ophidia* or Snakes, of which there are more than seventeen hundred recognized species, are found in tropical, semi-tropical and temperate parts of the globe. The tropical and semi-tropical zones are the real home of the reptiles, and it is in these regions that they reach their highest development as regards size and variety of form.

As air-breathing, cold-blooded animals they are unable to withstand prolonged cold, so that they are entirely absent in the Arctic and Antarctic regions. In the temperate zone certain snakes pass the winter months in a torpid condition, in well-sheltered places.

In the warmer parts of the earth, reptiles are found

in nearly all locations: deserts, swamps, grassy plains, hills and forests. All have their quota of species, some sharply restricted to certain kinds of environment and very local, others ranging widely and able to live and thrive under varied conditions. Naturally, species which, for instance, are highly modified for burrowing in sand or for life in the trees, are found only in deserts or in forests.

Except among those who specialize in systematic zoology, few realize how many species of reptiles are known to science. There are about twenty species of crocodiles and alligators; more than two hundred and twenty-five kinds of tortoises and turtles, including land, fresh-water and marine varieties; about seventeen hundred different kinds of snakes; and more than twenty-five hundred species of lizards. When these figures are considered, it is no wonder that the general public and the amateur student of herpetology may occasionally make mistakes in their identification of reptiles. The so-called "glass snake" or "jointed snake" is really a lizard. As these lizards have an extremely brittle tail and an aspect that is anything but lizard-like, they are generally known as the "glass snakes." Necessarily, being devoid of legs, they move like serpents, by lateral undulations, *but they have scales, movable eyelids and an ear-opening*, characters not existing among serpents. Their eyes are protected by a thin, transparent section of the outer skin or epidermis, which is shed and renewed periodically, as is the skin of the snake.

The "glass snake," when handled, really appears to creak in its tight-fitting scaly armor. If grasped by the tail, it disengages that organ with a single twist and leaves you holding the tail. No blood, however, attends

the shedding and the dismembered tail wriggles in livelier fashion than when attached to the main body. The popular story, however, that the "glass snake" later hunts up the discarded tail, with a view to patching up matters, is due entirely to faulty observation.

A snake is always most beautiful immediately after it has shed its epidermis, for then its colors are brightest and most iridescent.

The boa-constrictor, popularly thought by many to be the largest snake in existence, is really a puny fellow when compared with the Malayan python, which reaches a length of thirty feet, or the South American anaconda, which may even exceed the python in length and weight. The boa-constrictors, pythons and anacondas are constricting snakes and kill their prey by squeezing it to death. They have no poison-secreting glands. The boa-constrictor, being a snake of a docile nature and taking readily to captivity, is the species commonly sought by snake "charmers" and handled in the travelling shows.

There are doubtless plenty of big snakes in Asia and elsewhere that have never been caught. The difficulty is not that they cannot be found but rather in finding some one with the courage and initiative to bring them out of their jungle home. Captain Golding, of the "Afridi," brought to the Zoological Park the largest python that we have ever seen. That snake measured 24 feet and weighed 262 pounds. Animal dealers often offer us pythons of "estimated" lengths of from 25 to 28 feet but when they reach New York they seem to have shrunk anywhere from 6 to 10 feet. One of the finest pythons that we have ever exhibited was the one brought to us by Captain Richard Craven. This snake measured

exactly 22 feet and lived in the Reptile House for eleven years.

If the problem of eating was as simple for human beings as it is for pythons, living expenses would not be so great a worry. A python thinks nothing at all of going six months without food. One specimen in the Reptile House once went on a fast which lasted twenty-two months.

It is not unusual for freshly caught snakes to refuse to eat for several months after they have been captured. If, however, in two or three months, one of the giants seems reluctant to eat, and shows by its general condition to be in need of nourishment, forced feeding is resorted to. Our regal python "Czarina" was fed by compulsory methods for nearly a year before she took her first voluntary meal.

The forced feeding of a python of twenty-foot length is an interesting procedure and is effected in the following manner. First, four or five medium-sized rabbits are killed and the skin removed. The rabbits are then tied together—the hind legs of one to the neck of another—and attached to a long bamboo pole. This pole, with a blunt tip, is forced into the neck of the leading rabbit and made ready for the feeding.

The giant snake is taken from the cage by eight or ten keepers. The forward man throws a sack over the head of the python and then with both hands grasps the snake close to the head. The second man grasps the snake a foot or two from the head, the third man takes his place and is responsible for his two or more feet of python, until all the men are fully occupied in keeping the struggling monster in a straight line. By means of the bamboo pole the meal of rabbits is forced down the



SCHOOLGIRL WITH BOA CONSTRICTOR

throat for a distance of fully five feet and then the pole is removed and the snake returned to its cage. Food thus administered once or twice generally changes the snake's attitude toward feeding voluntarily.

The python never chews anything, but in its stomach are powerful gastric juices that digest the meat and bones in their entirety.

Before the Reptile House was officially opened, a snake shipment was delivered by the American Express Company after the Zoological Park had been closed for the night and the keepers had gone home. The Captain of the Watch received and receipted for a huge box, which was placed on the outside platform near the shipping clerk's office. This box contained an eighteen-foot python which weighed 130 pounds. Consternation reigned in the morning when it was discovered that the snake had escaped. In unloading the heavy box a board had apparently been loosened and the snake, finding the weak spot, had forced its way out.

When the Director learned of the escape he immediately sent for Patrick Kelley ("Dynamite Pat"), who was the foreman of the blasting force in charge of Zoo building-excavations. Kelley was told of the escape and ordered to get his men together and search for the python. Now "Dynamite Pat" did not have the slightest idea what a python was, but he was loath to show his ignorance of zoology before Doctor Hornaday. He thought he might find out something about a python if he asked a few canny questions. The first man he saw after leaving the Director's office was our Civil Engineer, George M. Beerbower. Kelley told him that a python had escaped and was hiding somewhere in the woods. "The Director told me it's twenty-two feet long!

For heaven's sake, how high is it?" asked Kelley. Mr. Beerbower caught on right away and he started to sketch hastily on the ground a huge dinosaur, meanwhile giving a running description of the fine points of the creature which he assured Kelley he would not fail to recognize at sight.

Kelley started out believing all he had been told, but with the fervent hope that he would not be the one to find it.

The python was finally found underneath the platform steps of the Cook House, which adjoined the platform on which the box had been deposited by the expressman. The snake was coiled up but not very active because it was thoroughly chilled. Returning the python to its cage seemed to offer a difficult problem but the task was performed in a comparatively simple manner. Doctor Hornaday, always on hand for all such emergencies, was the first to reach under the platform and he took a strangle-hold on the animal's neck immediately behind the jaws and dragged it to the opening. A line of eight men was quickly formed and as the exposed portion of the monster's body slowly appeared, a man seized a piece and hung on for dear life. Finally each of the men possessed a portion and was responsible for keeping about two feet of python in alignment. In returning the python to its cage it was entered tail-end first.

Kelley later reviewed the proceedings with good humor and laughed as heartily at the joke that had been played on him as did the rest of the men who were engaged in the hunt.

The swallowing capacity of certain of the big constricting snakes, like the regal python from Malay, has

been the subject of much exaggeration. There are many stories to the effect that hunters have observed a thirty-foot python engulfing an ox. These tales are utterly fallacious. The limit of their swallowing capacity would be an animal not larger than an American white-tail deer. Captive pythons prefer poultry and swine. A twenty-foot specimen has no difficulty in swallowing a forty-five-pound pig or three to four good-sized roosters, feathers and all, relying upon the powerful gastric juices to reduce them to nourishment. After three days the obvious swelling denoting the presence of the pig or roosters disappears. In from three to four weeks the snake by its activity indicates its desire for more food.

Live animals are not given as food to the reptiles in the Zoological Park. We have found that freshly killed chickens, rats and mice thrown to the reptiles are just as acceptable as live ones. The practice is to kill the food-animal and offer it immediately while it is still warm. We receive many requests "to see the snakes fed" but when the person learns that no live food is given, he seems to lose much of his interest in the procedure.

Captive King cobras usually refuse all food except snakes, and they have no aversion to taking snakes that have been freshly killed. This practice of giving freshly killed food affords opportunities to economize in food-snakes. Each snake killed for food is stuffed with frogs or young rats and thus made to equal in bulk and nourishment a half-dozen snakes. Such a meal lasts the cobra for two or three weeks.

The reptile collection in the Zoological Park is a very large and representative one and naturally requires many different kinds of food. The yearly animal food consumed by our reptile collection is about as follows:

800 large and small chickens.
200 pigeons.
1,500 English sparrows.
1,500 eggs.
300 rabbits.
3,000 rats and mice.
600 guinea pigs.

In addition to the above, thousands of fish, frogs and toads are also fed.

There are no standardized prices on snakes, since the price varies with the trouble involved in their capture. A 26 to 28-foot python is worth about \$1,000 while one of 22-foot length would bring about \$500.

The great majority of reptiles reproduce by laying eggs, which are hatched by the heat of the sun or by the fermentation of moss and earth-mould.

The anacondas of South America give birth to live young which are capable of entering upon an independent career immediately. Once, many years ago, a recently acquired anaconda presented the Reptile House collection with 64 young at one time. The young snakes at birth measured from 18 to 27 inches and were about an inch in diameter at the thickest part of the body. The color of the young was the same as that of the mother, dark green with round black spots.

The pythons, instead of giving birth to live young, lay from 50 to 100 eggs, which the snakes incubate by coiling about them until hatched, which takes from six to eight weeks.

The longest poisonous snake is the King Cobra of southeastern Asia which, though relatively light and slender, sometimes reaches a length of eighteen feet. The deadly Mambas or Tree Cobras of Africa are also

long, slender, whip-like snakes which attain the length of twelve feet.

Among North American reptiles there is but one poisonous lizard, the Gila Monster, and but few species of snakes are poisonous, among these being the rattlesnakes, copperheads, water moccasins and the coral snakes. The greater number of our snakes are harmless.

The snake stories we used to believe have nearly all been shattered by the modern herpetologists. There is no "hoop snake" that can put its tail in its mouth, stiffen its body into circles and roll down hill like a barrel-hoop; no "joint snake" that can separate itself into pieces and later assemble the sections and become a whole snake again; and no "coach-whip snake" able to lash his assailant with a stinging tail. There is a milk snake, but since its stomach capacity for liquids is about three teaspoonfuls, something else must be blamed when the cow comes from pasture with her udder dry of the expected two gallons of milk.

Not wishing to demolish all the usual beliefs about the snake world, I hasten to refer to one, frequently denied, which is absolutely true.

There is a species of snake that can really throw its poison. The first specimens of this kind, the African Spitting Cobra, were added to our collection about two years ago. The spitting cobra is a slender shiny black creature, seven feet long, with a flaring hood that adds to its alarming appearance. When aroused, it can eject its venom in a fine spray for a distance of eight to ten feet, aiming apparently for the eyes of its victim. The poison is quickly absorbed wherever it strikes mucous membranes. The skin is unaffected but the moist eye allows of an absorption so rapid that sharp pain and

temporary blindness instantly result from the contact. The natives of South Africa know the habits of the spitting cobras and they are greatly feared.

As boys we used to say, after killing a snake and seeing its tail continue to writhe, "He will die when the sun goes down." There was possibly a grain of truth in that, to the extent that the evening's coolness might cause a sort of paralysis of the involuntary muscular activity that continues even after the snake is beheaded.

The main differences between an alligator and a crocodile consist in the shape of the head and the arrangement of the teeth in the lower jaw. The typical crocodile has a narrow, triangular head terminating in a rounded point. The alligator's head is broad and bluntly rounded at the snout. The canine teeth in the lower jaw of the crocodile fit into the outside of the upper jaw, in a notch close behind the nostrils. In the alligator the canines fit into pits in the upper jaw, just inside the line of the upper teeth. The teeth of crocodilians generally are renewed as fast as old teeth are worn out. What a pity that the human family could not have retained this feature in its evolutionary progress!

Only a few specimens are considered dangerous to man. These are the crocodiles of the Malay Peninsula, Borneo and surrounding regions, and the West African species. The presence of a true crocodile in Florida was first discovered by Doctor W. T. Hornaday in 1875.

Thirty-foot crocodiles have often been reported, but none of that size has as yet been brought to any museum. The huge ones that have been subjected to a steel measuring-tape rarely exceed twelve to fifteen feet.

All the alligators reproduce by laying from 30 to 60 oblong, hard-shelled eggs in sand or vegetable-mould,



ALLIGATOR POOL, OUTDOORS



INDOOR ALLIGATOR POOL

where they are allowed to hatch by the heat of the sun. The eggs are about 3 inches long and 2 inches in diameter. At the time of hatching the young alligators are about 8 inches long.

The increase in size of a representative specimen, hatched from an egg in the Reptile House, was as follows:

Oct. 1900—hatched—	Length, 8 inches;	weight, $1\frac{3}{4}$ oz.
Oct. 1901	“ 18 “	“ $9\frac{3}{4}$ “
Aug. 1902	“ 23 “	“ 3 lbs.
Mar. 1903	“ 45 “	“ 14 “
Oct. 1905	“ 64 “	“ 50 “
Oct. 1906	“ 72 “	“ 72 “

An alligator 6 feet 11 inches long, received at the Reptile House in October, 1899, had increased to a length of 11 feet 6 inches in October, 1905. This was a gain of 4 feet 7 inches in six years.

There is a general impression that the alligator requires a very long period to attain maturity. This is by no means the case. It has been demonstrated by keeping careful records of a large number of alligators in the Reptile House that they grow quite rapidly. It would appear that an alligator attains its maximum growth at about twelve years of age.

The real patriarch among living creatures is the Giant Galapagos Tortoise, which very likely does attain an authentic span of two centuries. Scientists have estimated that certain specimens were four hundred years old, but I should feel safe in asserting that a tortoise three hundred years old was phenomenally aged. We have a Galapagos tortoise which has been on exhibition in the Zoological Park for twenty-seven years. When “Buster” arrived here he weighed 140 pounds. He now

weighs 305 pounds and appears to have reached his maximum growth, since he has not varied from this figure in a number of years.

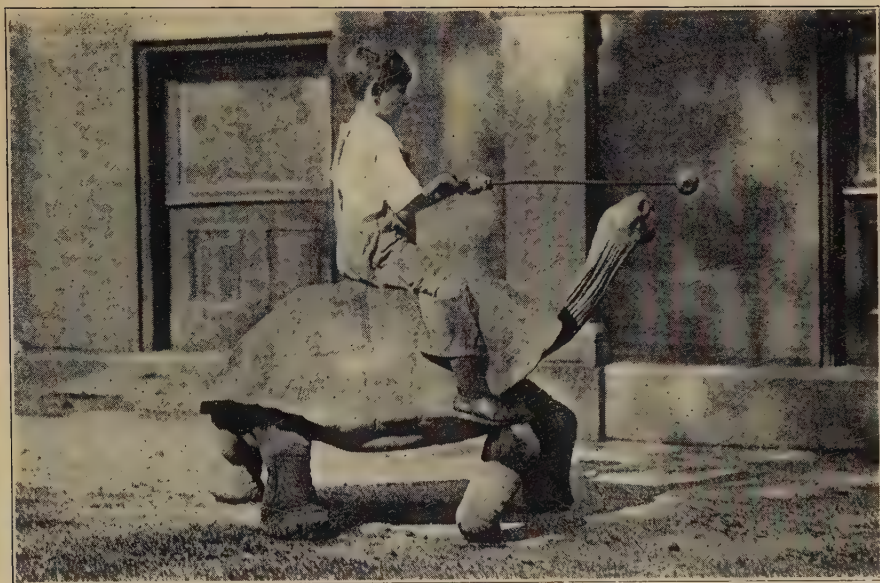
The giant tortoises are entirely herbivorous. In captivity they consume great quantities of green food, which varies in kind according to the season's supply.

There is little information on record respecting the growth of the giant tortoises. A twenty-nine pound male, taken from Albemarle Island in June, 1899, by Edmund Heller, lived at Riverside in southern California for fifteen years. Its weight at death was 415 pounds. This specimen increased its weight more than 300 pounds during the first seven years it was in captivity.

The growth of an animal in captivity, however, is no absolute criterion for estimating its natural growth, for in the wild state food and temperature are much less regular. The life span of an animal may be estimated with rough accuracy by multiplying by four or five the number of years it requires to reach maturity.

Instances are often reported of common small land-tortoises having been found with ancient dates carved on their shells. However, unless boy nature in other localities is quite different from that of the New England neighborhood where I grew up, one may suspect that young jackknife owners have not been over-scrupulous about presenting tortoises with a hundred or more extra birthdays. The popular dates were "1776" and "1812."

Giant tortoises are survivors of the age when reptiles attained colossal proportions. Fossil remains of the giant tortoises show that these creatures formerly inhabited three continents, but the survivors are now restricted to isolated groups of small islands in the Pacific and Indian Oceans.



GIANT GALAPAGOS TORTOISE "BUSTER"



"BUSTER" AND YOUNG GALAPAGOS TORTOISE

The New York Zoological Society, learning of the probable early extermination of the giant land tortoises of the Galapagos Islands by reason of various agencies, determined to make an effort to save the remnants. Last year the Society authorized Doctor Charles H. Townsend, Director of the New York Aquarium, to visit the islands, which lie 500 miles off the coast of Ecuador, with a special ship and to locate if possible any survivors of the tortoises that might be found in the almost inaccessible interior.

The expedition was a great success and Doctor Townsend and his party secured 180 tortoises on Albemarle Island and landed all of them safely in the United States. They varied in size from one which weighed only a few ounces up to the largest which weighed 130 pounds. After each tortoise had been carefully measured and weighed, it was tagged with a copper tag for future identification. They were established in small colonies at Balboa in the Canal Zone, Bermuda, Florida, southern California and elsewhere, in order that these remarkable creatures might be studied under favorable climatic conditions.

According to the log-book records of seventy-nine whaleships, preserved in the libraries of New Bedford, Salem and Nantucket, and examined by Doctor Townsend, it is recorded that 13,013 tortoises were taken from the Galapagos Islands between the years 1831 and 1868 as invaluable articles of food. As the larger of the tortoises weigh from 200 to 400 pounds each and their flesh tastes like beef, it is not strange that the sailors of the old whaling-vessels were glad to obtain them.

Dampier, who visited the Galapagos in 1684, says of the tortoises: "It is incredible to report how numerous

they are." It was the abundance of tortoises that attracted food-seeking ships for more than three centuries,—an attraction that persisted until the supply was practically exhausted.

Although the Galapagos Islands are virtually deserted except for the Ecuadorian Penal Colony, seafaring men until recent years visited the group to kill tortoises and the prisoners themselves used some of the animals for food. Wild swine and wild dogs on the islands killed many of the young tortoises, as well as ate their eggs, so that they have become entirely extinct on the smaller islands and recent expeditions report that they have apparently vanished on all the larger islands except Albemarle.

The largest of the sea turtles grow to a far greater size than the giant land tortoises of the Galapagos Islands. The great leather-back is the largest of the turtles and may attain a weight of 1,000 pounds. The New York Aquarium some years ago received one that weighed 840 pounds. They are rarely seen in captivity, however, since they seldom feed after they are captured, and consequently do not live more than a few weeks.

The largest living lizard, *Varanus komodoensis*, has only very recently been discovered. For years Malay travellers had reported that huge lizards were to be found on a small island near Flores, one of the Lesser Sunda Islands. These rumors reached naturalists, who promptly dismissed them since they knew of no authentic record of the animals' existence.

But the rumors persisted and dreadful tales continued to be told of the exploits of the huge lizards that could kill a horse. The amazing find was made by Lieutenant van Huisbroek, who in 1912 was serving as Dutch Civilian Administrator at Reo, on the island of

Flores. He made a trip to Komodo Island in the company of two fishermen and managed to kill one of these lizards, which was sent to Doctor P. A. Ouwens, Director of the Museum of Buitenzorg in Java, who was the first scientist to study these interesting creatures.

To an American belongs the distinction of capturing the first live giant lizard. William Douglas Burden, of New York, organized an expedition to try to capture several of these giant lizards and bring them to the Zoological Park. We agreed to pay \$1,000 each for two of the specimens if they could be delivered alive in New York City. Mr. Burden, accompanied by Mrs. Burden, organized a party of fifteen Chinese helpers in Singapore, and set out for the Island of Komodo, a volcanic island about twenty miles long and twelve miles wide at its widest point, the only island so far as is known which harbored the giant lizards. How this giant lizard got on this small island is a question that greatly interests naturalists.

When they reached the island they immediately set traps for the lizards. These consisted of rope nooses tied to trees which were bent over and fastened with a catch which would be released when the noosed rope was disturbed by the animals attacking the bait, which consisted of meat. The Chinese watched the traps and when one of the lizards was caught suspended in air, they rushed forward and lashed it securely with ropes and carried it to the teakwood box which was prepared for shipping it to America. Mr. Burden succeeded in landing two eight-foot lizards, the larger specimen weighing about ninety pounds. They were on exhibition in the Reptile House for several months, where they drew huge crowds of visitors daily.

The lizards live in caves which they dig under the

rocks. They have well-developed feet and are capable of moving with great rapidity. They have extraordinarily long necks, which allow the head to move in every direction. They seek their prey only in the day-time and return to their caves at dusk.

These giant lizards are carnivorous, devouring snakes, birds and mammals. They also show the characteristics of carnivores in the method of catching and tearing their prey apart as they devour it. Members of the Burden party observed them fighting among themselves over carrion.

The lizards make a loud, hissing sound when approached, and with the long, flat, forked reptilian tongue, which they constantly keep darting in and out of the mouth, it is quite possible that frightened and superstitious natives of ancient times, seeing these giant lizards, larger perhaps than present ones, thought that the darting tongue resembled a flame, and fled without taking a second look.

The saying that there is nothing new under the sun has been so often repeated that we take it for granted as the expression of ultimate truth; but when we see such creatures as these lizards cropping up, we realize how futile it is to pretend that all things are old and reveal no new knowledge. We become aware that the possibility of learning new facts in natural history is limitless and that we may still expect to make new discoveries.

That these lizards are descendants of the ancient dragons of China may be doubtful but it is possible that the multitude of legends, heretofore considered mainly as myths, may have been caused by the existence of the Komodo Island lizard's ancestors.



GILA MONSTER



GIANT LIZARDS FROM KOMODO ISLAND

A Chinese author described the dragon as having "the head of a camel, the neck of a snake, the body and scales of a fish, the eyes of a devil, and the feet and claws of a tiger." This description is not so very remote from the picture presented by our *Varanus komodoensis*.

The most famous lizard of North America is the Gila Monster of the desert regions of Arizona and Mexico. Externally the whole of the creature appears to be covered with round glass beads, black and yellow in color, laid out in a striking impressionistic design. They are slow-moving animals. The glands of the mouth secrete a poison capable of killing small rodents.

The blunt tail of the Gila Monster is actually a reservoir for storing up fat in times of plenty. When the animal has been steadily feeding, the tail becomes much enlarged. If food is withheld, the animal is capable of subsisting for several months upon the accumulated fatty tissue stored up in the stumpy tail.

CHAPTER XI

ANIMAL INTELLIGENCE

THE study of animal intelligence is interesting and important, whether we regard man as derived from some lower form and his intellectual as well as physical development the result of evolution, or whether we consider that man stands wholly apart in origin, either as to body or mind. Scientific observation hardly ever fails to concentrate the interest and wonder of the student upon the astonishing fashion in which the creatures which we assume to be irrational are continually acting as if by the guidance of reason. While at one time it might have been considered highly fanciful to suggest that the lower animals possessed a mind, few persons of any degree of experience will now be found prepared to deny that the so-called inferior animals have minds.

Perhaps the highest faculty man possesses is that by which he generalizes and forms conceptions of the abstract. That animals have imagination or the power to frame mental pictures of absent objects is amply proved by the grief of the dog at the absence of his master, and by the capacity of animals to dream. The boy who owns a dog, if left to follow his natural tendencies, must believe that his dog's thoughts and feelings are the counterpart of his own. Were it otherwise, why should he talk to his dog, play with him, impute motives to him, blame or praise him?

It is difficult to overestimate the benefit to the individual who, in the right spirit, makes a sincere study of animals. Such a study establishes a state of mind which

does no particular harm even when one may seem to exaggerate animal intelligence, and nearly always generates sympathy.

I do not mean to imply that we should become "nature fakers" in attempting to explain the behavior of animals. Nothing is to be gained for any cause by overstating the case and it is a mistake to claim that between primitive man and the most intelligent animals there is not a vast difference, even if we do not go so far as to say there is a great gulf fixed, as some appear to believe. It is still safe and wise to say "I don't know" about a great many things instead of assuming the validity of explanations which are not true solutions at all but mere assumptions.

The animal story which is true to nature requires in the writer an exact knowledge of the animal which he tries to interpret and perfect acquaintance with its natural conditions. In captivity, wild animals show different tempers and different degrees of appreciation. There is as much difference in their ways as in their general appearance, but there are few of them that do not in time yield to gentle handling and learn to look upon their keepers as friends instead of enemies. It is not unusual for an animal in captivity for any length of time to become aware of its own power of attraction and to regard another cage-mate with jealousy, if this companion should attempt to trespass upon its popularity.

Many of the performances of the lower animals are regarded as the outcome of mere instinct, by which is meant an endowment acting blindly and incapable of modification. The fact seems to be that instincts, as they exist, are the result of inherited experiences accumulated through considerable periods of time. It must be re-

membered that man's intellect is the outgrowth of hundreds of thousands of years, beginning with a condition of things scarcely, if at all, higher than that known to some species of animals. It would not be fair to compare the intelligence of the child of the savage with that of the child of the civilized man, any more than to compare an intelligent man with an animal. Before it is possible to compare man and the highest animal it would be necessary to allow the animal to have the advantages of culture for the same number of years.

It is often difficult to compare the mental status of animals to that of man because there is no common basis upon which the two rest. Their modes of life are so unlike as to afford no common unit of measure. Their faculties are developed along different lines. They have but few problems in common. While the scope of the human mind is vastly wider than that of the ape, it does not follow that it can act with more precision in all things. There are, perhaps, instances in which the mind of the ape excels that of man, by reason of its adaptation to certain conditions. It is neither safe, nor an infallible guide, to measure all things by man's opinion of himself. It is quite true that, by such a unit of measure, the comparison is much in favor of man, but the conclusion is hardly adequate.

The anthropoid apes possess and display the same fundamental passions and emotions that animate the human race, and these passions and emotions are readily recognized by even the ordinary observer. If we find an animal, say a monkey, exhibiting marked manifestations of affection, sympathy, jealousy or rage, can we doubt the complete analogy of these expressions with those that are manifested by man? I have seen a young chim-

panzee, made jealous by her keeper caressing an orang, uncover her teeth, and uttering a peevish whine, turn her back on the keeper with marked evidences of disfavor. I have seen a chimpanzee in a violent passion present a curious resemblance to a child in the same state. She screamed loudly, with widely opened mouth and with the lips retracted so that the teeth were fully exposed.

Some species of animals are more intelligent than others, just as some races of men are, and some are keener than others in the line of original thought. There are millions of men who know only how to do as they have seen others do. Mechanically-minded men who are given to original reasoning we call inventors. The animal world also contains its share of inventors. Of course it is true that not every animal possesses all the mental attributes of the human mind, and there are men and women of whom the same may be said.

In original thought and building ingenuity the American beaver is equalled by few animals, and in industry by none. The most wonderful thing about him is the manner in which he builds dams to make ponds deep enough for his timber-floating operations and to afford him a submarine passage to his lodge. Given a valley and a stream of water, he will gladly make a pond out of whatever raw materials are at hand. He uses sticks of about four-foot lengths, from which he has eaten the bark for food, and with these and an abundance of mud he will raise a good strong dam to a height of four feet and a width on the ground of fifteen feet or more. The mud used is dug out of the bottom and sides of the pond and carried between his paws while swimming, with his front feet holding it against his breast. The sticks used

in building the dam are thrust endwise into the mud and added to until a proper height has been established. The mud used is patted down with his forefeet. The tail is not used as a trowel as many suppose, but in swimming it acts as propeller and rudder.

The beaver thinks nothing of gnawing down a tree a foot in diameter and cutting its limbs into pieces which he can handle while swimming. He fells the trees with the skill of an experienced woodsman, making them fall just where he needs them most in building a dam or house. He constructs canals and houses for winter use. He also digs burrows into high banks but he knows that the entrances to his various homes must be under water.

How can we explain the mental processes by which animals are capable of finding their way back to the place from which they have been removed, when the distances involved are great and often when the animals have never travelled, so much as once, the way by which they return. As Darwin puts it, "How a small and tender bird, coming from Africa or Spain, after traversing the sea finds the very same hedgerow in the middle of England, where it made its nest last season, is truly marvellous."

With regard to the so-called "homing instinct" of birds and animals, it is of interest to note that the savage or semi-savage man possesses the faculty of finding his way in the trackless forest, through the possession of more accurate powers of observation than those of which civilized man seems capable. The great skill of the North American Indian in tracking and hunting was believed for years to be the outcome of keener senses; yet tests seem to show that the Indian does not see or hear any



TREE FELLED BY BEAVER



BEAVER REPAIRING DAM

better than the white man. His superiority apparently came from his greater power of discrimination, trained since earliest childhood, from the resulting knowledge of what to look for, and from the ability to interpret what he saw.

While this may throw some light upon the homing instinct of birds and other animals, it does not, however, adequately explain it. It may yet be proven that these puzzles are susceptible of simple explanation but at present they strike one as rather belonging to that class of psychic phenomena the meaning of which can only be inadequately understood by man, owing to his not possessing the requisite faculties, or to their being as yet in an undeveloped state of acuteness.

It is often claimed that animals are well-nigh witless because they do such foolish things, particularly running headlong into danger when an avenue of escape, perhaps several of them, is open. This claim of showing "no sense" is often heard and this supposedly strong argument is offered as proof of the creature's stupidity; but long years of familiarity with animals convinces me that under certain circumstances animals lose their wits through fear, which is something quite different from the lack of intelligence. Paralyzed by fear, a creature may act in an aimless way, when if free from terror its actions would be deliberate and it would consider all the conditions and proceed intelligently. Wild animals in their haunts put forth their keenest mental efforts in detecting danger and in devising means of escape from it. Closely allied to the mental faculties that promote successful escape are the ability and disposition to fight, and the final passion for revenge.

Regarding the comparative intelligence of domestic

animals opinions differ, according to conditions. If we compare the intelligence of our best races of dogs with any of their wild carnivorous allies, it will be readily apparent that there is a great difference in favor of the dog. This is due largely, if not wholly, to the advantage of his association with man for hundreds or thousands of years, and the capacity for education, which is one of the best manifestations of superiority.

The mental characteristics of the dog have probably been more studied than those of any other animal. He has been the theme of historians, philosophers, scientists and poets for ages, and yet the field is still open to culture and worthy of the best human endeavor. The dog is scarcely surpassed in intelligence by any known animal, teachable to a high degree, fitted for a wide range of duties, ready to adapt himself cheerfully to every condition of life however much hardship it may involve; forgiving without stint, meeting every wish and whim of his owner, contented with the simplest fare and the rudest shelter so that he may win his master's approval. Faithful, in many instances even unto death, it is not surprising that by the lowest savages and by men of the highest attainments the dog has been held in the greatest esteem and, after a fashion, made a member of the family circle.

The most remarkable dog I have ever seen was "Jasper," a mongrel, owned and trained by Mr. Dixie Taylor. This animal might be considered a "highbrow" among canines. In a private exhibition a few years ago he executed at the command of Mr. Taylor some thirty-five to forty different stunts, some of which are almost unbelievable. For instance, "Jasper" could discriminate between newspaper, magazine, book, waste-basket,

typewriter, bookcase, piano, telephone, handkerchief, necktie and many other objects, as well as distinguish between man, woman and child. Mr. Taylor would say, "Jasper, go out and bring a young woman in here," and the dog went into another room and brought in one of the young women working in the main office. Another command was, "Go to the outer office and write on the typewriter;" another, "Bring me the Doctor's handkerchief" (which happened to be showing in my top pocket). All commands were executed with gentleness and promptness.

Unlike the dog, the cat has received very little attention and consideration from man. There are many reasons for this neglect, but not least in significance is the fact that the cat is not a flatterer. The dog adapts himself to every caprice and whim of his master but the cat is always herself. I maintain that the intelligence and good qualities of the cat have been much underestimated. The cat does not become attached to its owner in the same way that the dog does, while on the other hand it reverts more readily to a savage or wild state. Cats never form the same degree of friendship for a person as does the dog, their attachment being more to a place than to a person, hence the reason why a cat so often wanders back to its former haunts.

While some parrots are accomplished talkers and clever mimics, they are not generally looked upon as birds of great intelligence. There are, however, a number of well authenticated instances where these birds have shown what might be considered a fairly high degree of reasoning power. I recall one instance where a gray parrot's cage was kept in the living-room of a private home. Occasionally the bird was allowed out and

permitted to climb about the outside of the cage. In order to keep the bird from climbing up and tearing the hanging lace window-curtains, the parrot's cage was placed two feet away from the window, well outside the bird's reach of the curtain. If the owner left the room for a few minutes when the bird was out of the cage, it was usually found climbing up the lace curtains when he returned. Since the bird could not fly, the owner was puzzled to know how it could reach the curtain, until one day he spied on the bird and learned how the feat was accomplished. The parrot climbed to the side of the cage nearest the window and by vigorously flapping its wings caused the curtain to swing to and fro, and when it came within reach the bird caught it with its beak and climbed up.

In reference to the intelligence of the most faithful servant of man, the horse, we have made much less progress than in the study of the dog. The reason for this, I believe, is due to the fact that the horse is a servant, rather than a companion, of man.

The mule has always been given the credit of having his full quota of brains, and during the World War he lived up nobly to his reputation for endurance, even sacrificing and dying like a soldier. When tired, he makes his condition known by quitting. However, this quality did not come to the fore during the fighting at St. Mihiel or in the Argonne.

In these days of the gasoline motor-car it will be well to recall that the mule is really the only fool-proof motive-power unit. He may run when hitched to a wagon but invariably does no harm to himself or to the wagon. He can work singly or in pairs, fours or sixes, and after a hard day's work he will return home all right whether

the driver does or not. In these days of irresponsible labor that is a big factor. Then, too, a driver cannot overheat a mule. When he gets too warm he slows down to a gait befitting the weather and not even the fluent vocabulary of an ex-cavalryman will persuade him to a greater speed. Brought in at night, it is sufficient to pull off the harness and turn this long-eared believer in "safety first" into a corral with food and water. He will roll until he is groomed to his own satisfaction and will not drink or eat until cooled down enough to make it safe to do so. No matter how much grain is accessible, he will stop eating when he has had enough, which is more than can be said of most horses, and some men.

We must not confound animal intelligence with the ingenuity of the trainer, as did King Louis when he was led to believe that a number of pigs had been successfully taught to produce musical sounds. It came about this way:

Abbé de Baigne, a great musician who supplied the Court with many curiosities in his line, was asked by the King if he thought it possible to produce musical sounds from the cries of pigs. The Abbé thought it was possible and received a grant of money from the monarch for the experiment. With this he purchased a number of porkers of different sizes and ages, and after testing the pitch and quality of their voices, secured them fast and arranged them in order in a large tent. He further constructed a keyed instrument, furnished with a number of wires tightly drawn, corresponding to the number of animals. But behind the scenes, at the end of each wire and almost touching each pig, was a short sharp spike which, when moved by the action of the key, pricked the pig and made it squeal. By this means

the Abbé produced such wonderful harmony as to astonish the whole Court.

One of the questions still far from clear is: How far can any of the lower animals understand man's various forms of expression, especially his spoken words? We should not expect that creatures unable to use words would have the capacity to understand them in the sense in which man himself does. However, I am inclined to believe that we have very much underrated their capacity to comprehend our various forms of unspoken language.

Another question to consider is the degree to which various animals can communicate with each other. It is possible that animals have modes of subtle communication which we are incapable of comprehending. If animals have a method by which they communicate with each other, then that ability to exchange thoughts and convey ideas is their language. We all know that domestic cattle, swine and fowls have each a language of their own, and as far as it goes it is almost as clear-cut and understandable as the talk of human beings.

Excepting the song birds, the wild creatures of to-day have learned through instinct and accumulated experience that silence promotes peace and long life. The bull moose which bawls through a mile of forest, and the bull elk which bugles not wisely but too well, soon find their heads hanging in some eastern dining-room, while the silent Virginia deer, like the brook, "goes on forever."

A few years ago there was a flood of talk on "the speech of monkeys" and the torrent continued for some time. At first the knowledge that monkeys can and do communicate, to a limited extent at least, by vocal

sounds was hailed as a "discovery," but unfortunately for science, nothing has been proved beyond the long-known fact that some of the higher apes and monkeys understand the meaning of the few sounds and cries to which their kind give utterance. The fact that we are not able in all instances to interpret their meaning is no reflection upon their intelligence. Take, for example, the chimpanzees. These animals, which come from the west coast of Africa, generally in the vicinity of the equator, live together in small bands of half a dozen and build platforms in the trees, out of boughs and leaves, on which they sleep. These apes are looked on by the natives of their country as being degenerate members of their own tribe. There is said to be quite a common belief among the natives that the chimpanzees refuse to speak, purely from laziness and in the fear that if their possession of this faculty should be discovered they would be made to work.

Once there was a startling exhibition of monkey language at our Monkey House. That was before the completion of our Lion House. We had to find temporary outdoor quarters for a big jaguar, and there being nothing else available, we decided to place him in the great circular cage at the north end of the series of outside cages at the Monkey House. It was summer and the baboons, red-faced monkeys, rhesus, green, and many other of the larger monkeys, were in their outside quarters. When the jaguar was released from the shipping cage and entered the big one, the fronts of the adjoining cages at once became literally plastered with monkeys and baboons, all in the wildest excitement. The jaguar was in full view of them and although not one of the whole lot, with the possible exception of the sapa-

jous, ever had even an ancestor who had seen a jaguar, they one and all recognized a hostile genus and a hereditary enemy. And how they swore at him and reviled him and made hideous faces at him! The long-armed yellow baboons barked and roared until they were heard half a mile away. The ugly-tempered macaques and the rhesus monkeys nearly burst with hatred and indignation. The row was kept up for a long time and the monkey language that was lost to science on that occasion was, both in quantity and quality, beyond compare.

Does the higher ape reason or is its every action instinctive? Can it think as we understand the term, or does it merely respond to an ancestral impulse stimulated by variations of necessity and environment? The study of the higher apes and monkeys, on account of their undoubted physical and mental resemblance to man, is naturally of the greatest interest. The higher in the scale the animal that is studied, the nearer we are approaching, on the whole, to man.

Any one who will watch the countenance of a monkey when he feels himself insulted, and again when he is fondled by his keeper, will be forced to admit that the movements of the features and the gestures are almost as expressive as those of men.

While there is a striking difference between the dispositions of the chimpanzee and orang-utan, the most intelligent of the apes, still their individual capacities for learning are nearly equal.

The temperament of the chimpanzee is of the nervous or stubborn type but its mind is more alert and prompt in action than that of the orang. On the other hand, the orang's disposition and actions are more like those of a child and he is capable of displaying real affection and



CHIMPANZEE

generally makes friends readily. The chimpanzee, while showing great affection for his keeper or those frequently about him, generally resents being handled by strangers. The chimpanzee exercises the faculty of reason with a fair degree of precision on problems that concern his own comfort and safety. He is quick to interpret motives, to discern intentions and is a rare judge of character. He is most observant of the relations of cause and effect and in his actions he is controlled by definite motives. He is docile and readily learns anything that lies within the range of his mental plane.

As a rule, monkeys are readily trained but occasionally there is one, as in the human species, who cannot be taught, is positively stupid, and refuses to become educated. The trouble in teaching monkeys is largely that they are so mischievous. They try to overdo things and do things which are not wanted of them, so that in order to make them perform as desired, steady drilling is necessary, although they grasp an idea quickly. The only two species of animals which can be readily taught by precept and example are the chimpanzee and orangutan. They are imitators and to instruct them in doing a thing it is only necessary for the trainer to do it first and then either of these animals will imitate him.

The chimpanzee is easily taught to wear clothes, to eat and drink in civilized fashion, to understand what is said to it, and to reply with a limited vocabulary of grunts. An exhibition that interested and amused many thousands of visitors at the Park during past years was that of the oranges and chimpanzees dining at a small table in the large open-air cage of the Primate House. Here, on every pleasant afternoon during the summer months, seated in high chairs drawn up to their elevated

table, these remarkable apes gave a very instructive demonstration of what could be accomplished with such animals by kindness and patient training.

Through the close and daily association with the men who care for them, apes quickly learn that in sickness or trouble they need human help. So quickly do they learn, some of them at least, that it is safe and wise to swallow anything that a friend offers in a spoon that they even accept and swallow medicines that do not taste good. To me this is evidence of sound reasoning, for from wild men to wild mice the first law of nature is that whatever does not taste good is not good to swallow.

The investigations of Professor Robert M. Yerkes, of Yale University, on "The Mental Life of Monkeys and Apes" furnish many interesting data for the student of animal psychology, as do also the results of the work of Doctor Melvin E. Haggerty on "Imitation in Monkeys," carried out in the Zoological Park and submitted to Harvard University as a thesis for his degree of Doctor of Philosophy. Doctor Haggerty's tests of the ability of young orang-utans and chimpanzees to solve simple problems and to use tools in various ways yielded results which may be safely accepted as evidence of a fairly high order of reasoning in these animals.

For instance, one of Doctor Haggerty's experiments was a problem submitted to our orang "Dohong." A piece of gas-pipe, three feet long and two inches in diameter, was securely fastened to the front bar of the orang's cage. In the centre of this pipe was placed a piece of banana and in the straw bedding a round stick, about three and one-half feet long. This stick was placed



ORANG "SULTAN"

in the cage without the orang's knowledge. After "Dohong" found the banana, he tried to reach it with his fingers and his feet, and by inserting stiff straws from his bedding. All of these methods being unsuccessful, he discovered the stick and with this he readily obtained the banana. After his first successful effort with the stick, which occupied some twenty minutes, all subsequent attempts resulted in securing the fruit within half a minute. "Dohong" nearly always drew the banana out toward him, but when he apparently accidentally pushed it through the other end of the pipe, he would occasionally use this method.

Another feat for which "Dohong" was responsible should be recorded. His trapeze, suspended from the roof of his cage by two heavy steel chains with the hickory bar attached by bolts, became broken. One of the keepers entered the cage, examined the bolt and found that a piece of it was broken off so that it was not long enough to pass through the end of the bar, and that a new bolt and nut would have to be provided before the trapeze could be used again. A short time later, however, the keeper discovered "Dohong" swinging around on his trapeze as usual, and knowing that it had not been repaired, he entered the cage to investigate and was much surprised to learn of the ingenious method whereby "Dohong" was able to use the bar. He noted that "Dohong" kept the end of the bar with the broken bolt slightly turned, perhaps a quarter turn, just sufficient to make the bolt bind, and as long as he kept it in this position he could swing and perform as well as ever. When, however, the bar straightened out, allowing the end to drop, "Dohong" fell in a heap in the straw at the bottom of his cage. This tumbling per-

formance always appeared to me to be premeditated and done to amuse or win applause from his many admirers in front of the cage. As soon as he recovered himself he carried the bar to the top of his sleeping box and, seated tailor-fashion, laid it across his knees, put the end of the bolt in his mouth, rolled it around and after sufficient lubrication removed it, pushed it through the hole in the end of the bar and gave it a slight turn, and he was ready for another swing.

This performance was kept up for many days and during that time "Dohong" repaired the bar probably more than one hundred times. It was while this trapeze was broken that he apparently learned the principle of the lever, for soon afterward he began to amuse himself by prying all the brackets, which support the wall bars, off the walls of his cage about as fast as the carpenters could replace them. He managed to break the heaviest cast-iron brackets, so that it was necessary to replace them by heavy hand-forged ones of steel and to bolt them through the partitions.

"Rajah," a three-year old orang in the Zoological Park, was taught to ride a child's velocipede in the short period of one week. He steered the vehicle without assistance and really seemed to enjoy the exercise, since he would ride in circles about the building for twenty to thirty minutes before dismounting. The first step was to endeavor to impress upon his mind the fact that the pedals propelled the machine and that his feet controlled the pedals. Finally, by grasping his feet and the pedals at the same time and drawing his attention to the operation, he soon mastered the art of propelling the machine unaided. Pieces of board and other objects were placed in his path to afford slight obstructions to the easy propulsion of the machine, but he soon learned



CHIMPANZEE "SUSIE"



TEACHING ORANG TO RIDE A VELOCIPED

that by putting more force into the pedals he could pass over the obstruction readily. If he did not succeed in passing it the first time, he would back off a few feet and renew the effort, and would continue this performance until he was successful.

Another interesting case was that of the orang "Julius" who was the subject of Professor Yerkes' experimentation with the unique box-stacking problem.

In a large cage, 20 x 10 x 12 feet, the following situation was arranged. From the centre of the wire covering of the cage a banana was suspended on a string so that it was approximately six feet from the floor. From all approaches it was far beyond the reach of the orang, since it was impossible for him to climb along the wire roof and so reach the string. Two boxes were placed on the floor of the cage several feet from the point directly under the banana. One of these boxes was larger and heavier than the other, and irregular in shape.

According to the experimenter's calculations, the only way in which the orang could obtain the banana was by placing the smaller box upon the larger one and then climbing upon them. The orang was admitted to the cage and the banana pointed out to him by the experimenter. He immediately set about trying to get it and worked diligently during the whole of the period of observation, which was ten minutes. Within this period the animal made upwards of a dozen fairly well-directed attempts to obtain the food. On account of the unfinished condition of the cage the experimenter had to remain in it with the orang during the test. This interfered with the experiment because the animal tended not only to try to escape but to get the experimenter to help him with his task.

After he had made two or three futile attempts to

obtain the food he came to the experimenter, who was standing in one corner of the cage, took him by the hand and led him to a point directly under the banana, grasped the experimenter's arm, raised it and then tried to pull himself up, but he was not allowed to get the food in this way. A few minutes later he again led the experimenter toward the banana but receiving no encouragement along this line, he devoted himself to other methods.

The experimenter then decided to test the orang's ability to get the idea by watching some one do it. For this, the following test of imitation was made. Having placed a banana in the usual position, the experimenter took the orang into the cage, dragged the two boxes to the proper position beneath the banana, placed the smaller box upon the larger one, and climbed up on them to show the ape that he could reach the banana. He then stepped down and gave the ape a chance to climb on the boxes. He did so immediately and obtained the food. Several days later the next test was made, with everything as usual. Unaided, the ape was given an opportunity to obtain the coveted reward, while the experimenter stood ready with a camera to obtain records of his behavior. The orang wasted no time but piled the smaller box on top of the larger one immediately and obtained the fruit. As soon as opportunity was offered he repeated the performance. After considerable skill had been acquired in the placing of the boxes, the height of the banana above the floor was increased so that three boxes were necessary.

Many people have been astounded at the intelligence displayed by sea-lions in their performances on the vaudeville stage. An Englishman, Captain J. G. Woodward, specialized in the training of seals and sea-lions

and taught these animals to perform many difficult and interesting feats. Two of Captain Woodward's star performers were deposited at the New York Aquarium and were on exhibition there for several months. Among their accomplishments were the balancing on their nose of large air-filled rubber balls, silk hats, billiard-cues, lighted torches and other objects. They readily passed balanced objects from one to the other without dropping them. They could produce sounds in concert on various musical instruments, such as horns, banjos, drums and cymbals. With a view to testing the memories of his troupe of sea-lions, Captain Woodward occasionally allowed the animals a three months' rest in the freedom of their enclosure and then gave a satisfactory performance, without a rehearsal.

In ability to reason from cause to effect under entirely new conditions, the Indian elephant is probably the wisest of all the lower animals. Of all the dangerous animals ever captured when fully adult, the elephant is the only one which promptly learns that the mind of man is superior to brute force, that its wisest course is to accept captivity philosophically, that it pays to be good, and that a cheerful spirit promotes peace of mind and longevity. This is one of the most striking and also universal instances of clear reasoning to be observed among wild animals.

An elephant caught wild and fully adult is mastered in about two weeks' time, or even less, and in from six to twelve weeks is actually broken or trained to steady service in the timber forests. In the timber camps of southern India every elephant is trained, as a matter of ordinary routine, to do by command at least sixteen different things.

The mental capacity, and especially the memory of

elephants, is best shown in the circus ring, where the animal's whole performance depends upon the acuteness of his hearing, his sight and his memory. The most striking manifestations of intelligence are the accuracy of the elephantine memory, the promptness with which he responds to commands, and the great number of things remembered. Among trained dogs, horses and lions it is only the exceptionally apt animals that reach the exhibition platform but with elephants every one is a "star."

I have several times observed how our Indian elephant "Alice" obtained peanuts or other tidbits placed often as much as three feet beyond the reach of her trunk. By blowing a blast of air from her trunk against the partition wall back of the object, she readily blew the peanut or other food toward her and well within easy reach of her trunk.

An aged farmer from the vicinity of Port Jervis, N. Y., recently visited the Zoological Park for the first time as the guest of one of our officers. After spending two days here, he was asked what had impressed him most. After thinking for a few moments he replied, "To think that an animal as big as an elephant would be interested in anything so small as a peanut!"

In less than one day Keeper Gleason taught our Indian elephant "Gunda" to pick up pennies from the floor, raise the lid of a small box placed high above his head, drop the pennies into it and register them by ringing a bell. He then looked for his reward. If it was not forthcoming in the shape of forage biscuits or peanuts, he would ring the bell until it did appear. It was soon noticeable that although "Gunda" was an accomplished beggar and teller, his banking methods were

somewhat peculiar. While the deposits were heavy, there was at times a correspondingly heavy shortage. Upon inspecting the books it was learned that "Gunda" dropped the penny into the box but afterward very deftly picked it out again and put it in his mouth. When the keeper was away from the stall, "Gunda" put the cent on the floor until a visitor came along, when he went through the form of dropping it in again and ringing the bell. To prevent this fraud, small staples were driven in the bottom of the "banker's" box so that the penny fell between them. However, "Gunda" simply stretched the tip at the end of his trunk and lifted the penny out as before. It was only by using long nails in place of staples that the trick was prevented. But "Gunda" was equal to the occasion and developed another method of acquiring extra tidbits. One morning while standing near by, "Gunda's" keeper heard a penny drop into the bank, then another, until he counted four. Stepping quickly to the front, he saw the wise elephant reaching to the flat top of the partition wall with his trunk. When detected, "Gunda" walked slyly away and the keeper, on examination, found nine other pennies on the wall.

As a result of long years of experience in observing the ways of animals, I am convinced that all studies and experiments in the field of animal psychology should have for their foundation the full and complete admission that all the higher animals do reason, and that between them and man the mental differences are in degree only, not in kind.

CHAPTER XII

HOW ANIMALS TAKE CARE OF THEIR TEETH

NATURE abhors a useless organ, consequently if the genus *homo* persists in refusing to Fletcherize or exercise his teeth, we may find some future scientist proposing the transferring of men from the high order of Primates to the low order of Edentata, or toothless animals. It is a well-established fact that no animal can possibly remain long in good health whose teeth are in an unsound or unhealthy condition.

The importance of the mouth, and especially of the teeth, being kept in a normal condition cannot be over-estimated, as deviations from this rule not only interfere with the efficient mastication of food, but if pronounced, may actually prevent the animal from feeding at all. A consideration of the physiology of digestion in the ruminants, such as cattle and deer, will readily explain the fact that unless the food is properly prepared in the mouth by thorough mastication and incorporation with saliva, the process of gastric and intestinal digestion becomes disturbed and various disorders of the stomach and intestines are likely to follow.

From an anatomical point of view it is quite clear that the primary preparation of food for gastric digestion is amply provided for in all animals. In the ruminants, the size and shape of the molar teeth and the well-developed masticatory muscles indicate that thorough crushing and trituration of the food was intended by

Nature as an essential preliminary process for efficient digestion.

It will be observed, by a study of the arrangement of the teeth in the carnivorous, flesh-eating animals, that their purpose is to bite, tear and crush their food. In these animals, Nature makes no provision for grinding or mastication. Food is bolted and passes into the stomach without meeting with either a mechanical change from the teeth or a chemical one from the salivary secretion of the mouth.

If the diet of these animals is properly chosen and bones with meat attached are judiciously fed, the animals will clean their own teeth and obviate the need of a professional dentist. However, when unsuitable soft foods are substituted, then tartar, which consists of carbonate of lime and other organic substances mixed with bacteria, is deposited on the teeth from the saliva and accumulates, causing inflammation, absorption of the gums, and gradual loosening of the teeth. The enamel on the teeth is nature's defense. When this is destroyed, decay follows. In cases of tartar accumulation, followed by neglect, the gums become swollen, spongy and tender, and bleed at the slightest touch. The breath is usually very offensive and evidences of digestive disturbances soon become apparent.

Dogs are frequently subject to various dental disorders, and other animals often suffer severe toothache, which causes them to be irritable, to howl and to evince great pain if the affected tooth is subjected to the slightest pressure. In old dogs we often see an acute inflammation of the periosteum and the alveolar process becomes inflamed, with the formation of an abscess at the root of the tooth. The pus often finds its way to the

outside through the alveolar process and the gum, forming a fluctuating swelling. This condition is apparently identical with pyorrhea alveolaris as seen in the human.

Occasionally one is brought in contact with what appears to be an abscess in the face, a purulent discharge appearing a short distance below the inner canthus of the eye. In the early stages the animal shakes its head, rubs its face on the ground, and shows pain on external pressure. One who is unfamiliar with the cause may treat the wound and it will apparently heal, but in a week or two the discharge breaks out again, and is as bad as ever. The true cause of this condition lies in the antrum, at the root of the fourth premolar of the upper jaw, and until this tooth is extracted no permanent cure may be expected.

True decay of the teeth, with molecular disintegration of the constituent dental tissues, from which mankind so conspicuously suffers, is exceedingly rare in the dog and other carnivorous animals. The relative immunity of these animals to this disease may be attributed to the well-known inactivity of their parotoid saliva, and the feeble capacity of the submaxillary secretions. It will be remembered that in the human mouth the ptyalin of the saliva is very active in the conversion of starch into fermentable sugar, thus producing an ample supply of the pabulum necessary to sustain the fermentative process of the microorganisms causing the degenerative action. But as those conditions do not exist in the carnivorous mouth, the amount of fermentable sugars present is infinitesimal, and in the absence of sugars the microorganism is powerless to effect a decaying influence.

The teeth of the dog, and of all the carnivora, are adapted for seizing, holding, tearing and cutting, rather

than grinding. In a perfectly healthy animal the teeth remain white for years but if there be abnormalities of the digestive juices, the teeth are apt to become discolored by tartar, which in the early stages is observed on teeth as a yellowish or brownish deposit. When it has invaded the alveolar cavity, the gums assume a more or less livid color and become sensitive or painful to the touch. At the same time a foul odor is emitted from the mouth.

Incrustation of tartar occurs very commonly, especially in city dogs. It is now the common practice of owners of pet dogs to have their animals' teeth examined and treated by veterinarians periodically, and it is not unusual to see dogs, throughout the larger cities, with artificial teeth.

The effect of tartar accumulation on the teeth and surrounding tissue at first is purely an irritative one but later the deposit gradually works its way in between the neck of the tooth and the wall of the alveolar cavity, so that the tooth becomes loosened and may eventually drop out. The popular notion that gnawing of bones serves to "keep the teeth clean" and that an animal fed bones will not suffer from accumulation of tartar or have diseased teeth is a misconception, since tartar collects around the roots of the teeth, where any rubbing process of bone on tooth can scarcely take place. On the other hand, bone-eaters are notoriously prone to suffer from worn teeth, not to speak of internal disorders engendered by splinters and fragments of bone.

It is well to give a house-dog meat attached to bones, hard biscuits and crusts of bread which will require plenty of mastication and exercise, in order to keep the teeth in a healthy and clean condition. When giving

bones to meat-eating animals it is important that there shall be some meat and fibrous tissue on the bones, so that the animal in tearing the tissue will have plenty of exercise of the teeth and gums. The tissue acts as effectively in keeping the teeth clean as does the use of dental floss in the case of human teeth.

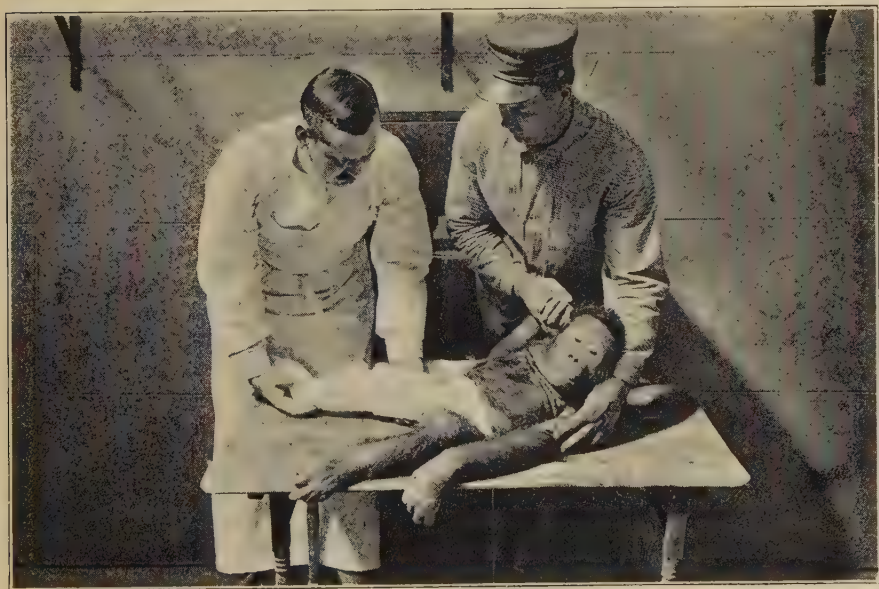
Animals in captivity in zoological gardens, being deprived of the normal food to which they have been accustomed in their native state, are liable to suffer from various diseases of the teeth unless we are successful in providing an artificial diet that meets with all the requirements of their natural food. In many instances these substitute diets are readily obtained but in other cases a great deal of experiment is needed before the proper one is found.

The African antelopes in captivity are necessarily deprived of much of the exercise which they would normally take in a wild state, so that extra care in feeding is necessary to keep these animals in good condition. Under normal conditions of grazing, these animals would keep their teeth in a healthy condition. In a very large proportion of digestive disorders noted among these animals, one of the chief causes is the imperfect mastication of food, due to hurry or defective teeth.

In order to insure a more thorough masticating of the food by the grain-eating animals, like the antelopes, we have adopted a hard, dry, baked biscuit which is made up of various grains like oats, corn, and bran, to which are added molasses, bonemeal, salts and other minerals. The fact that these prepared biscuits are dry and brittle makes it necessary for the animal to thoroughly masticate the food before it can be swallowed, and it is therefore in better condition for digestion.



EXTRACTING TOOTH OF CHIMPANZEE



ORANG WITH BROKEN LEG IN CAST

The daily food of the big cats, such as the lions, tigers and jaguars, consists of ten to twelve pounds of lean raw beef. These animals are all rapid feeders, and in order to compel them to eat more slowly the bone is left in the meat. The bones also aid in keeping the teeth free of tartar accumulations and otherwise clean and sound.

Because of the apes' and monkeys' great susceptibility to many of the ailments or diseases which affect human beings it is not strange that they suffer from diseases of the teeth like caries and pyorrhea. During the process of teething in these animals the gums become very red and inflamed and in some instances the inflammation is so intense that there is complete disinclination to eat.

Convulsions not infrequently occur in lion cubs and other young carnivorous animals when teething, owing to the severe reflex nervous irritation incidental to the cutting through of the permanent teeth. The presence of a decayed tooth may be expected if the mouth exhales a bad odor, or if the animal occasionally stops during mastication as if it were in pain.

The food of the giraffe, elephant and hippopotamus is much the same in character but a glance at the teeth of these three animals will show considerable difference in number and appearance. In our own mouths we have the front teeth or incisors, then the eye-teeth or canines, which are often larger in savages than in civilized people. In some of the baboons these form cruel fighting weapons. Behind these again are the grinding teeth or molars.

The giraffe, like other ruminants, has no incisors or canine teeth in the front of the upper jaw but instead there is a hard pad against which the lower teeth close.

The giraffe makes great use of his long, flexible tongue, with which he daintily plucks the leaves of the trees on which he feeds. The food cropped by the tongue, aided by the lower incisors, is masticated by the strong grinding teeth, which wear down so as to give a crescentic pattern, the crescents being marked out in hard enamel, within and between which is the softer dentine. This crescentic pattern is characteristic also of the teeth of cattle and deer.

The gigantic mouth of a hippo, when opened to its widest, looks like a huge red cavern, from the edges of which project the enormous tusks and incisor teeth. In the front part of the hippo's mouth there are two incisors and one tooth on each side of each jaw. The eye-teeth of the lower jaw stick out sideways like ugly tusks, while the inner cutting teeth project forward in a most forbidding manner. The front part of the mouth, armed with these awkward, misshapen projections, is broadened out so as to give support to the enormous lips. To reconcile the dangerous-looking teeth with a vegetarian diet requires faith in the observing powers of those who have studied the hippopotamus in a wild state.

Years ago, and possibly to some extent still, our artificial teeth were made from hippopotamus ivory which does not, like the ivory of the elephant, turn yellow with age. Now, while there is a closer connection between the teeth of the hippopotamus and our grandmother's than we suspected, and while its teeth do not differ so very much from ours, I think we would hardly care to exchange the arrangement of ours for that of the hippo.

When we come to the elephant's teeth, we find some

of the most marked peculiarities that are exhibited by any member of the animal kingdom. Most striking, perhaps, are the long, curved tusks which continue to grow throughout life. These are incisor teeth. All the other front teeth and the canines are lacking from the elephant's upper jaw and there are no incisors or canine teeth in the lower jaw. The elephant, however, is well supplied with twenty-four large molars, six on each side in both upper and lower jaws. The record pair of incisor teeth, or elephant's tusks, are exhibited in the National Collection of Heads and Horns in the New York Zoological Park. The longest one measures 11 feet, 5½ inches and is 18 inches in circumference at the base. Together they weigh 293 pounds.

CHAPTER XIII

MEDICAL TREATMENT OF CAPTIVE WILD ANIMALS

WITH the wild animals at which you gaze through bars, or the pictured presentation of which you view in the pages of the magazines, you associate very definite sensations. You think of them as wild or savage, or terrible; but do you ever associate with them any taint of weakness or trifling malady? Mumps and the lions? Ingrowing toe-nails and the tigers? Elephants with tender feet? Apes with toothache? Do you know that the wild animals in the modern zoological parks have hospitals? Do you know that these animals have physicians and surgeons to care for them? Are you aware that the lion has its manicurist, the elephant its chiropodist, or the monkey its dentist?

Although zoological gardens have been in existence for many years, it was not until the New York Zoological Society opened the Zoological Park in New York City, about thirty years ago, that a systematic attempt was made to care for wild animals in captivity in a scientific way. Before that time, captive wild animals had been treated in a more or less hit-or-miss fashion. If they lived, very good; if they died, why, no one was to blame. The New York Zoological Society, however, believing that an ounce of prevention is worth more than a pound of cure, established a medical department composed of physicians, veterinarians and pathologists,

for the purpose of studying the diseases of wild animals and the best means for their prevention and cure. Prevention of disease is the constant aim of the medical department.

To provide for the treatment of disease and for the operations which are necessary where a large number of animals are kept in captivity, it is essential that hospital accommodations be provided. The New York Zoological Park has a well-equipped hospital. There is probably no other hospital where such a varied list of patients might be seen. The hospital is conveniently located near the centre of the Park and well isolated within a walled enclosure, which insures quiet. It is a large, single-story brick building containing medical and surgical wards, operating room, pharmacy, diet kitchen, quarantine room, research laboratory and the Doctor's office and study. All the wards are equipped with sanitary cages. Electric exhaust fans, which can be regulated to insure a perfect system of heating and ventilation, are installed here.

Our experience soon taught us that in order to combat successfully the introduction of diseases to the Park animals, especially those of a contagious nature, a most complete and efficient quarantine system was absolutely necessary. The invasion of a contagious disease is dangerous in proportion to its capacity to elude observation and make good its attack. Too great faith must not be placed in port inspection, for the detection of contagious diseases. It is well-nigh impossible for a port inspector to detect disease in a latent form, or to discover whether apparently healthy animals have been in contact with those which are sick. Moreover, it is difficult to obtain even a good view of an animal which is

boxed for a long journey, and the first place in which real inspection is possible is at quarantine quarters.

With animals arriving almost daily from different parts of the globe, great care must be exercised in guarding against the introduction of a possibly diseased animal into a collection known to be healthy. To meet this contingency we have established a system of quarantine, whereby the new animals are isolated for a short period and carefully observed before being placed on exhibition, and the results are excellent.

The value of this system has been many times demonstrated by animals which have died within a few days after their arrival, the autopsies revealing highly contagious diseases which would no doubt have been very disastrous and far-reaching if introduced into cages of healthy animals. Many years ago the introduction of a small ferret suffering from distemper was the source of a severe epidemic of this contagious disease among wolves, coyotes and foxes, with a loss of over ninety per cent of the infected animals. So, it will be seen that a grave form of disease may be introduced and communicated by apparently mild or trivial cases.

In some instances it has been found practicable to place the newly arrived animals on exhibition at once in isolated corrals or cages, but an animal is never placed in an enclosure or cage with healthy animals until we are reasonably sure that it is perfectly healthy.

Probably every fatal, contagious or infectious disease affecting domestic or wild animals is caused by a specific microorganism that in each case has a life history of its own, and all measures for the prevention and restriction of such diseases must be based on the characteristics of each particular parasite. In the manage-

ment of all communicable diseases among Park animals, the lines of action follow the well-defined rules of sanitary science and we have obtained the most satisfactory results.

Disinfection as a preventive of disease plays no insignificant part in the medical work of the Park. In addition to powerful disinfectants and deodorizers, there are several natural sanitary agents of great importance as destroyers of virus. These are cleanliness, ventilation, drying and sunshine. Nearly all virus, excepting such as may live in the soil, is killed sooner or later by drying and sunshine, and the importance of these factors in the daily life of our animals cannot be exaggerated.

All sanitary measures which contribute to the healthfulness of our animals' surroundings are directly or indirectly antagonistic to disease germs, while all carelessness in the keeping of animals may be regarded as an ally of these destructive organisms. These matters regarding sanitation, ventilation and sunlight were matters of consideration in the planning of all the Zoological Park buildings. The almost total absence of disagreeable odors which visitors to zoological collections usually associate with monkey and lion-houses is frequently commented upon.

The frequent and thorough disinfection of buildings, dens and cages, whether there have been contagious diseases or not, will in our opinion be a great factor in keeping zoological collections free from anything like an epidemic. Eternal vigilance is the price of the rare and valuable specimens exhibited in zoological parks. Among the Zoo's charges are some of the rarest and most valuable specimens in the world, and it goes without saying that the death of any of these would be a

great blow to the scientific world, not to mention the financial loss entailed, even if it were possible to replace them.

The care of the wild animals in the Zoological Park is usually entrusted to "keepers" of the widest experience that can be obtained. These men, as a rule, are sympathetic and intelligent,—two qualifications requisite for a man to become a successful keeper. He who is most familiar with the appearance and deportment of a wild animal in health at the various periods of its existence will most readily appreciate all departures from the normal.

The difficulty in arriving at a true diagnosis is greater in the case of wild animals than with the domestic species. Where docility is a pronounced factor, one arrives at a diagnosis by a process of elimination, by the use of the thermometer, by noting the pulse, by percussion and auscultation of the chest cavity, and by otherwise handling the patient without causing undue excitement.

The physical examination of many of the smaller animals, especially the monkeys, is comparatively easy, but it is not so easy with some of the larger primates. An orang, chimpanzee or large baboon may be so nervous or ferocious as to make a physical examination not only extremely difficult but many times even impossible. Great care must be taken in handling all members of the order of Primates,—which includes the higher apes as well as the baboons and monkeys,—as they are very sensitive creatures, with strong likes and dislikes and very good memories. This we have observed on many occasions. One of them may be so treated that it would be almost impossible for the same person to succeed a second time in examining him. However, if the subject

has the good sense to realize that no harm is meant, he will usually quietly submit according to his natural amiability.

Gentle animals, like monkeys and many members of the antelope, deer and goat families, may be handled almost as one would handle a child; but the carnivorous beast, like the lion, tiger, leopard, and jaguar,—whose one instinct is for blood,—is a different proposition. A sick lion or tiger behaves exactly as one would expect these kings of the desert and jungle to behave. Their stoical indifference to pain, no matter how acute or prolonged, is indeed remarkable.

Before making an examination of a patient, the “history” of the case is obtained from the keeper, and upon this much depends. To the experienced it means a great deal, and upon it alone a fairly safe diagnosis may often be made. In many instances, the disorder is readily apparent and the exact location of it easily determined. For instance, coughing and rapid or difficult breathing point at once to the chest as the seat of the trouble. In many other cases, much greater difficulty is experienced. Patient watching, however, with a careful analysis and study of each individual case, usually dissipates all doubt.

When an animal is ill it is, if practicable, removed from its fellows, whether its disease be contagious or not. In the former case the reason is obvious, but in all cases quietness and extra comfort are needed. The patient can be better observed, the symptoms more closely noted, and the disease from which it suffers more clearly defined, when it is alone and left to the exercise of its own undisturbed will.

Prescribing medicine for a caged wild animal is like

prescribing medicine for a human patient, only much more difficult. While the human patient can tell you his feelings in their regular order, we can only infer most of these in the animal through external manifestation of pain or discomfort. The wild-animal physician must carefully watch for and accurately observe all such symptoms, and then endeavor rightly to interpret them.

If to all the obstacles in the way of treating these animals you add that wild animals in captivity are subject to almost all the diseases common to man or the domestic animals, and that nearly every wild animal is well equipped with claws, horns, sharp teeth or tusks and often with strength and agility far beyond that of a human being, you may get some idea of the difficulties with which the wild-animal physician must contend. One advantage the animal doctor has over the human practitioner is that he does not have to listen to a long tale of imaginary ills from his patients, nor do they first fill themselves up with patent medicines and then come to the doctor as a last resort. Unfortunately, the "patent medicine man" has not yet appeared with a panacea for every ailment to which the wild animal is heir.

An important point in giving medicines to these animals is to concentrate drugs as much as possible. Since it is best that the animal should not know that it is getting medicine at all, it becomes necessary to disguise the drug in some way. Modern pharmacy has provided a large number of preparations for the practitioner of human medicine which in some respects are far more necessary to him who ministers to sick animals that cannot understand the object of what must seem to them ill-usage.

Again, there is every reason why they should get their

medicine in the way that will cause the least disturbance to their feelings and without that excitement which may follow a struggle to give medicine. Small pills, gelatine-coated or sugar-coated, sweet lozenges, tablets or gelatine capsules, carefully concealed in an innocent-looking banana, may be administered to an unsuspecting ape without the slightest trouble. Occasionally, however, he may suspect, and great is your dismay at seeing him minutely pull the banana apart, find the offending pill, test it with his teeth, smell of it, and finally, with a wry face, cast it through the bars of the cage at his keeper. Generally the successful administration of medicine depends upon the interest and ingenuity of the keeper, whose knowledge of each one of his charges is a matter of routine.

A large number of the diseases from which captive wild animals suffer are caused by improper foods. Too much food causes first fatness and then physical degeneration. Improper methods of eating produce indigestion, and parasites contained in the food often give the animals fatal intestinal troubles. To prevent these troubles, overfeeding is stopped by rigorously prohibiting the public from giving the animals tidbits and by regulating each animal's supply of food according to its physical condition and the amount of exercise it takes. By giving the animals food that requires complete mastication they are made to eat properly. Also they are fed at the same hour each day and the food itself is made wholesome by cooking and sterilization.

The diseases most common among captive wild animals are stomach and intestinal troubles, parasites, skin diseases, lung affections, particularly pneumonia, bone affections and a number of contagious diseases peculiar

to animals. At times there are also isolated cases of various other ailments, such as mastoiditis, tonsilitis and mumps. A certain course of treatment is prescribed for all creatures suffering from the same kind of disease, although there must be slight variations according to the temperament and vitality of the individual patient.

Intestinal troubles caused by eating either too much or too fast are peculiar to all cats, some hoofed animals, bears and wolves, small mammals and monkeys. The general treatment consists in withholding all solid food and administering soothing, astringent medicine in small quantities of beef-juice or milk. The carnivora habitually bolt their food, the result being indigestion. The same is true of the monkeys, which are notorious gluttons. Buffaloes, deer, sheep and goats suffer from indigestion and intestinal disorders if they are permitted to graze on our large ranges, because they invariably eat too much rich grass. Since these animals have four stomachs instead of one, as in man, it is often difficult to have medicine reach the particular stomach that is affected with indigestion; consequently, when the medicine reaches the site of a deer's indigestion it is more often by good luck than by good management that the remedy proves effective.

Skin diseases are confined to the cats, small mammals and the pachyderms or thick-skinned animals, like elephants and rhinoceroses. The remedies consist of soothing antiseptic lotions and ointments. The badgers, raccoons and kangaroos suffer from a peculiarly severe skin disease, a sort of suppurating eczema. Fortunately, it yields readily to treatment.

The elephant, although it has a hide almost impervious to rifle-bullets, does not resist well the attacks of

the microorganisms that swarm on its body. Through even the smallest fissures of its tough hide they penetrate their way to the tender skin beneath and there set up a severe irritating inflammation. To prevent this, it is necessary to keep the elephant's hide from drying and cracking. In its native state the elephant, by swimming, and by wallowing in the mud, keeps its hide soft and pliable. In captivity, however, the epidermis tends to become hard and to split open. This tendency is overcome by thoroughly oiling and massaging the creature's hide, twice each year, with cocoanut oil.

When a generally accepted opinion is made the subject of a careful investigation it not infrequently proves to be erroneous. This is particularly true of tuberculosis among monkeys. The general public holds the belief,—and, strange to say, it is sometimes endorsed by ill-informed members of the medical profession,—that the majority of all monkeys in zoological collections die from tuberculosis after a few months of captivity.

After careful investigation, over a long term of years, of the diseases of wild animals in captivity, we fail to find any reasonable excuse for so widely spread an error. There have been too much theory and too little observation and record of facts in the treating of wild animals and it is mere speculation to say from what disease they might or might not die. The prevalence of tuberculosis shows a direct relationship to the opportunity for infection rather than to climate. It is the prevailing disease of civilized communities with dense populations, where crowded buildings give every opportunity for infection. The same condition applies to the over-crowding in animal buildings.

Tubercular diseases have played a very unimportant

part in the death-rate of the Zoological Park. This is due, first, to the careful selection of the animals purchased; second, to the hygienic buildings in which they are quartered; third, to the removal of any animal at the first signs of the suspected disease; and fourth, to the thorough disinfection of the cages after removal of such animals and before healthy ones are placed in these compartments.

Pneumonia affects practically all animals, but the cats, small mammals, monkeys and sea-lions are most frequently affected. In these animals, as in man, the disease cannot be cut short but must run its course. The treatment is to give the sick animals plenty of light, fresh air and warmth, with nourishing foods and stimulants. Monkeys suffering from pneumonia usually make good patients on account of the ease with which they may be handled. In addition to receiving the general treatment, they are covered with warm woollen chest-jackets and also receive frequent inhalations of medicated vapors from a croup-kettle.

The sea-lions contract pneumonia during changes of season. They are given stimulants and cod-liver oil, hot salt-water baths, massages, and blanketing afterward.

Distemper, an affection so common in the domestic dog and cat, is a disease greatly dreaded in all zoological collections because of its highly infectious nature and the large number of species susceptible to its contagion. No precaution, however stringent, can be considered unjustifiable.

Distemper is not only a highly contagious disorder but one in which medical treatment is often very unsatisfactory. There is no specific remedy for distemper known at the present time. The method which we en-

deavor to follow in regard to this disease is to closely inspect and quarantine those animals which are subject to it when they first reach the Park and to immediately isolate sick animals upon the first symptoms suspicious of the malady. Unless the animal is a particularly valuable species, it has always seemed to us best to destroy it at once and to thoroughly disinfect the cage in which it had been confined. All feeding and drinking vessels that have been near distemper patients must be equally well sterilized. Only so long as such measures are strictly enforced may one feel reasonably safe from an epidemic of distemper.

“Cage paralysis” or “cripples” is a condition of such frequent occurrence, particularly among monkeys, that it forms one of the most serious obstacles to the maintenance of large and complete collections of these in captivity. “Cage paralysis” closely resembles the disease of rickets observed in young children and in the bones of a number of our domestic animals.

This disease is commonly seen in the smaller monkeys that are kept as house pets. One of the first symptoms manifested is that the animal becomes less active than usual and, instead of running and leaping about, sits on the floor and takes very little interest in its surroundings except at feeding time. Gradually a noticeable stiffness is apparent when the animal moves about. This stiffness is most marked in the posterior extremities and generally progresses quite rapidly. Later, the movements of the animal become sluggish, its actions resembling those suffering from rheumatism.

We have found direct irradiation by means of artificial sunlight to be of great value in the early stages of the disease. Everything possible should be done to

improve the general health. Sunlight, dry and well-ventilated quarters, as well as a varied and nutritious diet, are absolutely essential.

The nursing of sick animals is of the greatest importance. The essentials are pure air, sunlight, cleanliness and warmth, together with a nourishing and sustaining diet. During convalescence all kinds of food are offered to tempt the appetite, first one thing and then another, but no food is allowed to remain before the animal because the very fact of its being constantly present will cause him to loathe it. When the animal has no appetite it usually indicates that the stomach is not in a proper state to digest food, consequently if forced upon him it will cause indigestion and aggravate the case.

CHAPTER XIV

SURGICAL TREATMENT OF CAPTIVE WILD ANIMALS

SURGICAL operations on captive wild animals are made necessary by accidents more frequently than by disease, consequently no two of them are exactly alike and the surgeon must be both versatile and resourceful. Operations may, however, be divided roughly into the following classes: the removal of excrescences, fractures, the treatment of incised wounds and the treatment of abscesses. There are certain other operations so rare that they do not properly come under any of these heads.

Good surgery is impossible without perfect restraint or control of the animal to be treated. The veterinarian is confronted with very difficult problems pertaining to the restraint of wild animals. Without sufficient means of controlling an animal for examination or surgical treatment, the veterinarian and his assistants are in constant danger of great bodily injury, while the animal itself is in danger of self-inflicted injury as a result of its efforts to resist.

Naturally, certain types of animals do not yield graciously either to examination or treatment, while others are more satisfactory patients than some humans. Occasionally, powerful and active animals are placed under control with very slight trouble and accept such future treatment as the case requires. In a way, that implies that the patient realizes the benefit of the aid it is receiving.

To overpower a very large animal preparatory to an operation is often a problem that presents much difficulty. Should the animal which needs the doctor's attention be large and capable of exerting strong physical opposition, even though it be of a placid disposition, delicacy of handling is out of the question. Even if the patient is docile, any attempt to place it in a position other than the one which it chooses to assume is difficult. The animal apparently recognizes the difference between the friendly touch of its keeper and the seemingly hostile intentions of a group of half a dozen men surrounding it.

In order to secure an animal properly and successfully nothing is so important as that the person in charge of controlling the animal should possess good judgment, associated with plenty of courage and confidence. He must retain a level head in spite of any unusual incident which may chance to take place. He must guard against getting excited or unduly alarmed and provoked in case everything does not transpire as expected or desired. Experience and dexterity are not to be underrated in an operator who undertakes the task of securing and properly confining the larger of our wild animals.

General anæsthesia is administered whenever an animal is to undergo any painful operation because, in addition to the humane sentiments involved, the resulting perfect control of the animal is essential to aseptic or antiseptic surgery as well as to the safety of the operator and his assistants. Chloroform and ether are the drugs used for producing general anæsthesia, but when the operation is a minor one and the animal can be satisfactorily controlled, local anæsthesia is readily produced by injections of cocaine or morphine.



PYGMY ELEPHANT WITH SURGICAL BRACES ON ANKLES



OPERATION ON INDIAN RHINOCEROS. ANIMAL HOBBLER AND
UNDER CHLOROFORM ANÆSTHESIA

An interesting and unusual operation—in the field of animal surgery at least—was that which was performed on the eyes of our large Indian rhinoceros.

“Mogul” was threatened with total blindness because of rapidly-forming cataracts affecting both eyes. An expert on diseases of the eye was consulted and upon his advice the operation of “needling” was performed. This operation, a common one in human surgery, consists of cutting through the capsule of the crystalline lens of the eye for the purpose of allowing the heavy cloudy humor of the lens to escape into the watery humor where it undergoes a process of clearing by slow absorption. A cataract is not, as many suppose, a growth over the eyeball, but a gradual change of the humor in the crystalline lens from a clear substance to a milky opacity which eventually destroys the sight.

Preliminary to the operation Mogul was cast upon a bed of straw by means of a combination of ropes and hobbles, in order to keep him under restraint. After securely fastening the animal, a professional anæsthetist administered a mixture of chloroform and ether. Owing to the difficulty in keeping the powerful Mogul under control, nearly an hour elapsed before the animal was sufficiently under the influence of the anæsthetic to permit the surgeon to proceed with the actual operation. Mogul’s energetic resistance required the use of one and one-half pounds of chloroform and three-quarters of a pound of ether.

The incision in the eyeball was made with a small thin knife of special and ingenious construction. After penetrating the front capsule of the crystalline lens, the blade was turned and withdrawn, making a T-shaped incision, and through this opening the humor of the lens was allowed to mix with the aqueous or watery humor

of the anterior chamber of the eyeball. The knife-blade was then turned back and withdrawn through the corneal covering of the eyeball exactly the same way in which it entered the eye, thus effectually preventing the thin humor of the anterior chamber of the eye from escaping.

The operation was bloodless and painless. Mogul, despite the enormous amount of anæsthetics taken, was up and standing steadily on his feet within half an hour after the operation.

Paring an elephant's corns is the one operation that the wild-animal surgeon can count upon performing fairly regularly. The sole of an elephant's foot consists of an elastic substance not unlike hard rubber. It wears away properly when the elephant is free but becomes, when the animal is a captive, abnormally thick and hard and pains the elephant exactly as a corn pains a human being. Just as the human being wears off the heels of his shoes unevenly, so the elephant in shuffling about its small enclosure wears its foot-pads off on one side. Therefore it is often necessary to cut away the excess of the foot-pad in order to relieve the pressure on the sensitive tissues beneath, and to level the foot so that the elephant can walk comfortably. Fortunately, most elephants take kindly to the operation.

Fractures are of frequent occurrence among wild animals in captivity. Many of these are due to external causes, such as falls, contusions, fighting of corral mates, while others arise from the fragility of the bones as the result of certain pathological conditions affecting them, especially the disease osteomalacia (cage paralysis) and rickets. Fractures in primates, which are of such frequent occurrence, are nearly always the result of these diseases.

Fractures of the bones of the larger hoofed animals may be considered as incurable, due to the fact that it is either very difficult or impossible to apply a bandage on these animals so as to secure repose and restitution of the fragments of the injured bones sufficiently long to permit of healing. When large animals are thus injured, it is often necessary to kill them at once in order to prevent further suffering. The smaller ones can be repaired and saved. If the fracture has taken place below the hock or knee, corresponding to our elbow or knee, the limb is put in splints and a plaster cast and bound firmly to the body. Usually an animal with a fractured leg thus treated will make a complete recovery and without a limp. For three or four weeks the animal will hobble about on three legs and sleep on the side of the body opposite the injured leg until the healing of the bone takes place.

From a practical standpoint, fractures are divided into simple and compound fractures.

The simple fracture is a fracture of the bone without injury to the muscle and skin. A compound fracture is accompanied by injury to the tissue and skin, so that the broken bone is exposed and entrance of infection is possible. A fracture may be complete or incomplete. In complete fractures, the bone is broken across its entire diameter, so that the ends are not attached to each other. In incomplete fracture, the separation is only partial, that is, a split in the bone. There is great danger of an incomplete fracture becoming a compound one.

“Green stick” fracture is a common and good illustration of a true incomplete fracture. It is called “green stick” because the appearance of the fractured bone is about the same as when a green stick is held at either end by the hands and broken across the knee, leading to

a pulling apart of the fibres on the outside while the concave portion, that is, the one resting against the knee, is compressed. In the bone, therefore, a portion of its thickness is broken, while the balance is bent. This type of fracture is most frequently seen in young animals, particularly the members of the monkey family.

The symptoms are extremely variable, according to the nature of the fracture. While the complete fractures, especially the complicated, are easily recognized, the diagnosis of the incomplete or split-bone fracture is often difficult. Inability of an animal to support weight on any limb, or sudden lameness, should cause suspicion of fracture. Abnormal position and pendulant position of the limbs, excessive swelling in any part of a limb accompanied by lameness and without evidence of external injury, is one of the important symptoms of fracture. Crepitation at the point of fracture, that is, a rough rubbing sound on manipulation and passive movement of the fragment, is very characteristic and is a direct sign of the existence of a fracture, especially a splinter fracture.

When judging a fracture with reference to its healing or non-healing propensities, a number of factors must be considered. The species of the animal is of the first importance. In the larger hoofed animals, complete fractures of the vertebra, femur, tibia, scapula, humerus and radius must be considered incurable.

The age of the animal has an influence on the healing of bones. Healing proceeds more slowly in old animals than in young. Young animals can remain standing or recumbent without danger for a longer time than those advanced in years. Adult animals as a result of standing for a long time upon their legs, frequently develop

a severe inflammation in the sensitive parts within the hoofs, leading to pressure, laminitis and permanent lameness. Remaining for a long time in a recumbent position also produces contusions and gangrene of the skin with general sepsis, because of the great body-weight of some animals.

In the smaller hoofed animals, such as the antelope, deer, sheep and goats, fractures have been successfully treated.

The first problem in the treatment of fractures consists in reduction, or replacement of the dislocated ends to their normal position by means of a pull. The second consists in retention or fixation by means of a bandage. Reunion can only take place when the broken parts are in complete rest.

The plaster-of-Paris bandage is the only one used unless for very small animals, where its weight is objectionable. It is applied as follows:

After the broken ends of the bone are in position and firmly fixed, layers of cotton-padding are laid on, especially at the seat of the fracture, so that the broken ends are well bolstered. A light gauze bandage is then applied. Over this bandage is laid a plaster-of-Paris bandage which has been soaked for a few minutes in lukewarm water. The plaster bandage must be applied in such a manner that a uniform and extensive layer of plaster comes in contact with the broken area and its vicinity. After the bandage is applied it may be strengthened by applying some of the prepared plaster in the form of a paste.

The bandage must not exert too great pressure and care should be taken that the folds of the plaster bandage are not too large or unequal. The bandage, on the

other hand, must not be applied too loosely. It should be inspected daily with special reference to pressure and construction. If there is any evidence of excessive swelling or blue coloration of the skin, either above or below the bandage, it should be loosened or entirely removed.

Special care is required in the application of a padding over the seat of the fracture, if located near a joint or where the muscle tissue is scanty. Whenever it is possible, the neighboring joints immediately above and below the fracture should be included in the bandage, since this favors immobility of the fractured area.

After the application of the plaster-of-Paris bandage the animal is kept as quiet as possible by giving plenty of bedding and is confined in very close quarters, in order to discourage movements which might disturb the bandage. With small animals, shutting them up in a small cage is desirable.

The bandage may be removed in from three to five weeks.

Plaster-of-Paris bandages cannot be applied in compound fractures where there is extensive injury to the skin and soft parts. Such fractures in most wild animals are hopeless on account of the necessity of frequent handling of the animal in order to control the infection of the wound which nearly always takes place.

Many wounds are the result of fighting among cage or corral mates. Often these are of such a serious nature that the animal is killed outright, or so badly injured that it is necessary to destroy it at once. Occasionally, however, an apparently fatal injury ends in complete recovery. For instance, one of our female elk was so badly gored by an angry buck that the abdomen was

ripped open and the intestines protruded through the wound. She was captured, the intestines washed with antiseptic solution, returned to the abdomen, and the wound closed with fourteen stitches an inch apart. The animal was then confined in a narrow crate, so that it could not turn about and disturb the bandage, consequently it recovered completely.

Incised wounds are frequently caused by animals picking up wire or nails in their feet. If the animal happens to be a buffalo bull, it is driven into a small enclosure, lassoed, thrown down, and tied by its three well feet, while five or six men sit on the struggling beast. The surgeon finds the troublesome nail or other foreign body, removes it, packs the wound with antiseptic dressings, applies a bandage, and then the animal is released, the wound usually healing without further dressings.

Abscesses seen among wild animals are invariably due to fighting of cage or corral mates. Antler-prods are the most prolific cause of the abscesses among deer. Among the smaller animals, bites and scratches are the common cause.

Symptoms of inflammation precede the suppuration, or formation of pus. There is heat, pain, redness and swelling in the part. The quantity of pus increases and by its presence causes the absorption of the boundary of the abscess wall, more particularly of that portion nearest the free surface of the body, generally the skin. The swelling becomes soft in the middle, followed by the elevation of the centre into a prominent spot. This is called the pointing of the abscess.

A noticeable feature in the pointing of an abscess in wild animals is the loss of hair, this falling off and

leaving a bare spot on the most prominent part of the swelling. This is accounted for by the absorption of the skin and destruction of the hair follicles which takes place before the abscess finally bursts.

Among the deer, antler wounds in the buttocks are apt to cause extensive infiltration of pus throughout the inter-muscular connective tissue of the thigh. Very often, after an apparent recovery from a wound in this region, the lower part of the thigh will begin to swell and on examination the enlargement will be found to contain a large quantity of pus, extending from immediately above the hock to the groin, the pus having burrowed from the wound above and, by gravitation, forced its way down among the tendons of the various muscles. Occasionally there are direct signs of pointing but more frequently not. All such collections of pus, wherever situated, are released by puncturing the lowest part of the swelling.

In acute abscess, soothing remedies are the most useful and, of these, heat and moisture are the best, as they not only soothe but promote the formation and development of the abscess. These consist of warm fomentations and poultices, and if the pain be excessive some anodyne, as Tr. Opium, may be applied locally. If the abscess is deep-seated or serious, cutting operations are done under general anæsthetics or morphia (cocaine may suffice in some cases) and with all antiseptic precaution.

The hair surrounding the abscess is clipped or shaved off and the place thoroughly scrubbed with antiseptic solutions before any cutting is done.

It is not usually necessary to anæsthetize before opening an abscess when it is superficially situated, but the

knife used should be very sharp and the incision decided. There is no necessity for violently squeezing the abscess after it is opened, but it should be syringed out with some good antiseptic solution, such as peroxide of hydrogen, creolin or a weak solution of Tr. Iodine. If a free incision is made into the tissue in the most dependent part of the abscess, thus affording proper drainage, no after-treatment of the abscess is necessary.

Tumors sometimes occur in wild animals but not as frequently as is generally supposed. These, of course, must be removed as early as possible because of the danger of their becoming malignant.

A few years ago our big alligator "Mose" developed a tumor on his left front foot, necessitating an operation for the removal of the growth. Preparing a twelve-foot alligator for an operation is a risky task. Placing this big fellow in position for the operation was no simple matter and was somewhat akin to catching and holding a greased pig. It was finally effected in the following manner. First the head was swathed in a gunnysack, to blindfold him and permit the binding of the jaws together with strong rope. Then a thick plank, 18 inches wide, was placed along his spine, to which he was securely lashed fore and aft. Thus secured, he was rolled on his back, plank and all. In this position, and after the tissues surrounding the growth were rendered painless by local anæsthetics, the removal of the tumor was a simple matter. The growth weighed 3½ pounds and the patient made a complete recovery.

A good example of intelligent submission to treatment was the case of a llama affected with an abscess on the jaw,—a not uncommon malady among hoofed animals. For this operation it was necessary to throw

the animal and control it with ropes, empty the pus cavity, cleanse it with antiseptic solution, and pack the wound with gauze. After the first short period of excitement, the animal abandoned itself to the various stages of the none too pleasant operation without a struggle, and each successive time that the wound required dressing and repacking, the llama stood quietly and permitted the work to be performed without offering any resistance whatever, not even attempting to walk away until the wound was completely dressed. A human patient anticipates a surgeon's visit for similar treatment with every emotion except joy.

A piece of bone jammed between the molar teeth of a Bengal tiger transferred a fairly tractable cat from a condition of docility into one of maddened frenzy. She raged around the cage and clawed and tore at the offending bone in her endeavors to remove it. With the greatest difficulty she was gotten into the mechanical shifting-cage and carried to the lighted areaway at the south end of the Lion House. In the interval of time that the procedure required, her fury was greatly intensified. The muscles of her body and legs were twisting spasmodically and her eyes glowed like opals as she charged and struck the sides of the cage.

Drawing her head to the bars was a hazardous move but it was finally accomplished by means of a rope around her shoulders. A pair of long forceps was then thrust into the cage and the end of the bone firmly gripped. Up to that moment she had regarded every move as persecution, but the forceps no sooner touched the tormenting object than she relaxed completely and the bone was removed without difficulty. She abandoned herself absolutely to the joy of release from her misery,



OPERATION ON A GRIZZLY BEAR

lay quietly on the floor of the car while the rope was slipped from her head, and when the car was rolled back to her quarters, walked out placidly and stretched herself on the floor of her cage, perfectly at ease.

These are exceptional cases. The majority of the hoofed-animal patients struggle desperately when restraint is attempted and nearly all of the large cats are extremely savage and resent any interference vigorously.

On several occasions in her young days our African rhinoceros, "Victoria," required surgical attention for an abscess that had developed on her left cheek, affecting the lower jaw-bone. She showed a mild temper but whenever any attempt was made to restrain her, her physical energy and activity proved all out of proportion to our estimate of her strength. In the early stages of the development of the growth, she yielded readily to the surgeon's knife and to subsequent dressings. Several operations at infrequent intervals reduced the swelling but did not completely arrest the progress of the growth, although a perfect cure seemed to be effected each time. A further recurrence of the trouble convinced us that a more thorough operation was necessary.

Elaborate preparations were made and a force of men was assembled to aid in the operation. A professional anæsthetizer, a dozen keepers, ropes, patent hobbles, mattresses, pails, absorbent cotton, a varied assortment of surgical instruments and appliances, and two and a half pounds of chloroform and ether were arrayed on one side, and a twelve-hundred-pound rhino on the other. "Victoria" fought a noble fight that morning, with malice toward none, and she emerged from the anæsthesia groggy and triumphant. Had it been

possible, without the slightest doubt she would have returned thanks that the operation was a complete success.

The occurrence of broken bones among the monkeys and apes is not infrequent, but as these animals usually yield obediently and without much protest to any operation or treatment, recoveries are the rule after an interval of three or four weeks in the hospital. The causes of these fractures, so frequent among these animals, are often puzzling to account for. It is difficult to understand just why so agile and surefooted an animal as a monkey, baboon or ape should suffer such an accident as a fractured leg or arm. Of course it is not so hard to understand when the subject is a long-legged wading bird like a flamingo, crane or stork, with whom a sudden thrust might cause some fragile bone to snap. Even the mountain sheep, goat or antelope might easily break one of its long bones if the animal's foot happened to get caught in the crevice of a rock; but when an elephant by merely making a misstep can fall and fracture one of the heavy thigh bones, it seems extraordinary, to say the least. Our African elephant "Sultana" slipped off the sloping incline of her outside yard, fell about ten inches, and in this seemingly trifling accident fractured the right femur and two ribs. Of course a broken leg in an elephant is beyond repair and there is only one thing to do in such cases, and that is to have the animal humanely destroyed, and as quickly as possible.

Although usually not a difficult task, the extraction of the aching tooth of an ape or a monkey often proves to be an interesting operation. Some time ago a chimpanzee that was always friendly with the doctor required such an operation. When its cheek began to be

painful, in consequence of a decayed tooth, the animal readily submitted to the doctor's examination of its mouth. A keeper held the ape in his arms, the doctor quietly fixed his forceps on the ailing tooth, and before the chimpanzee knew what had happened, the tooth was out. But the ape, like a petulant child, resented the hurt. When it saw the blood on its tongue it cried like a baby. Then it became angry and tried to bite the doctor, and for a long time the animal continued to show its resentment toward its former friend.

